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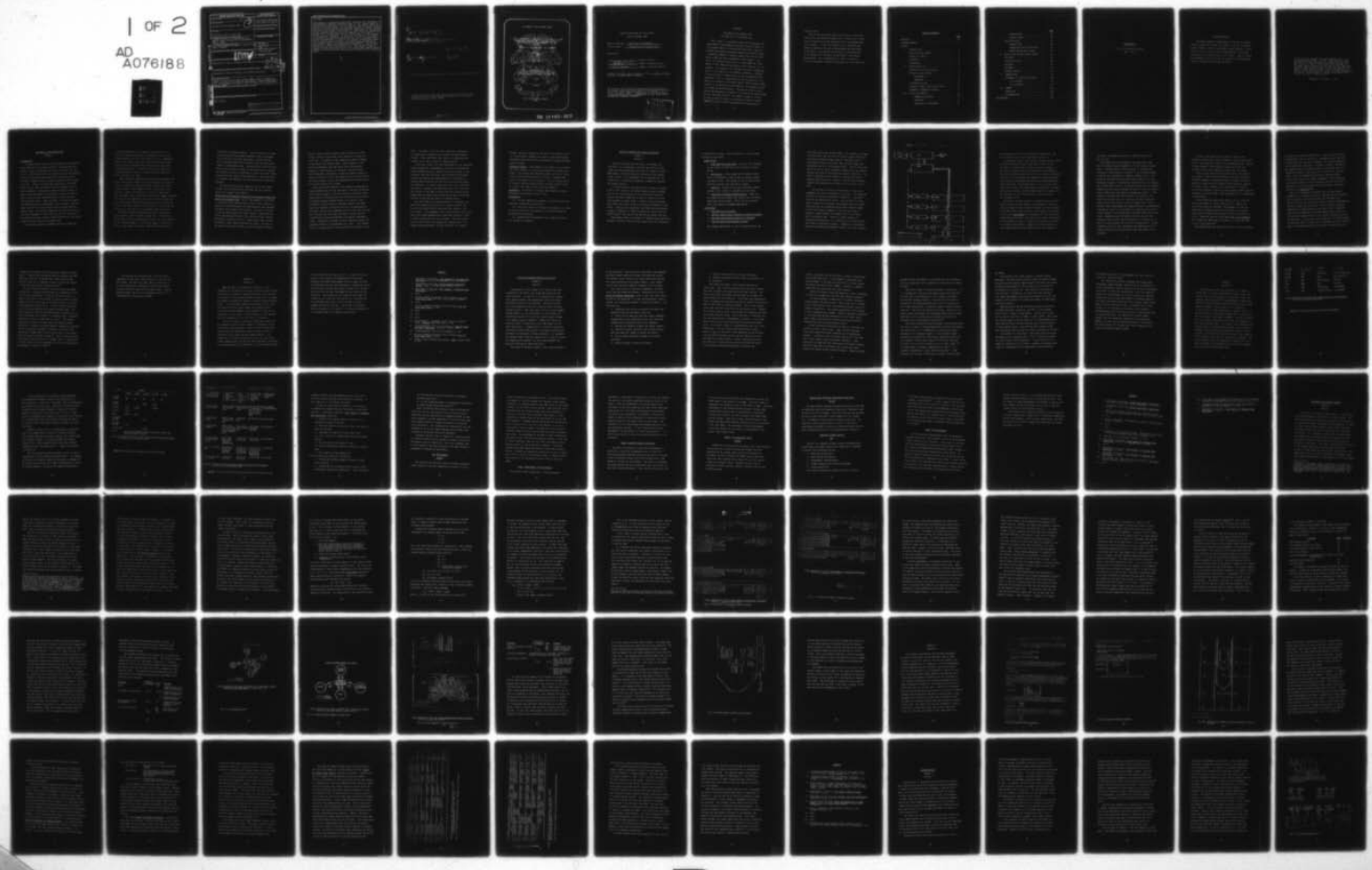

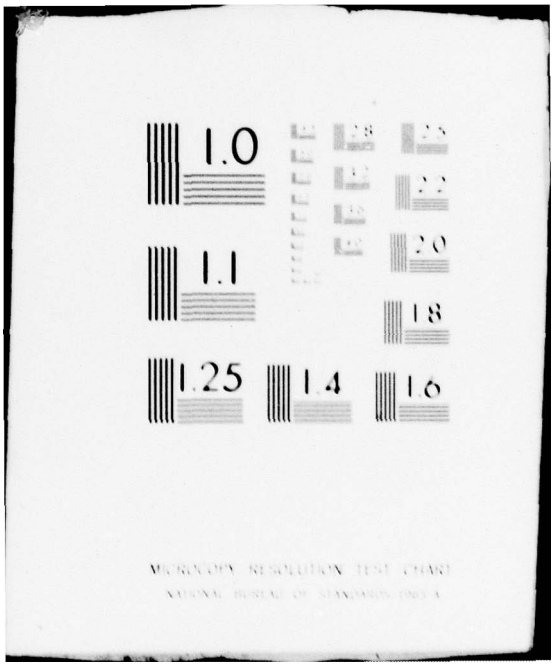
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A thesis presented to the Faculty of the U.S. Army Command and General Staff College in partial fulfillment of the requirements for the degree

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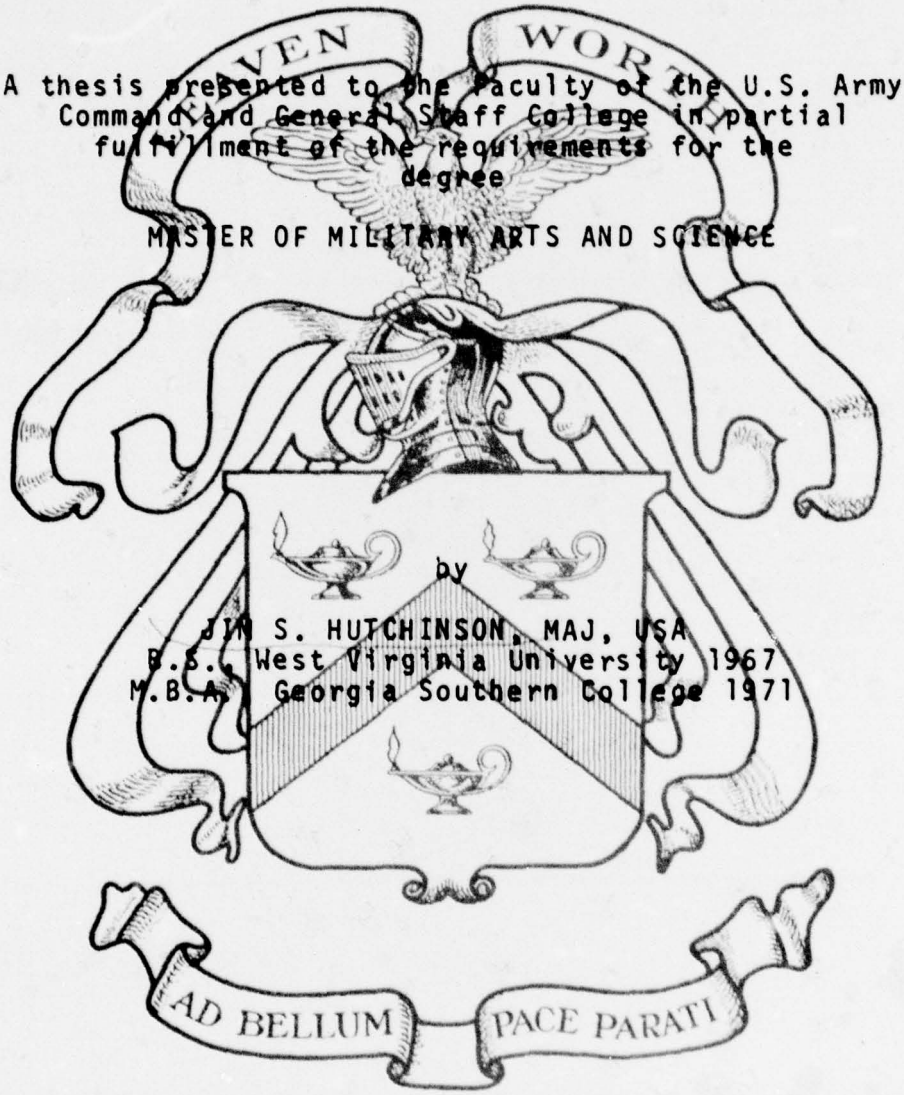

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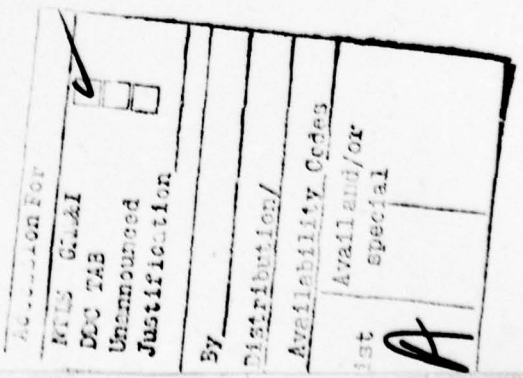

ABSTRACT

THE AERIAL FIRE SUPPORT TEAM

BY MAJOR JIM S. HUTCHINSON, USA

This study is a conceptual paper which addresses the advantages of simultaneously employing multiple types of fire support means to include field artillery, close air support, and attack helicopters against an armored threat. It examines advances in weapon systems that will be available by 1985 and their employment in the concept. The Aerial Fire Support Team (AFIST) is based upon the fundamental of the combined arms team but with emphasis on fire support. Its purpose is to increase the overall effectiveness of fire support to the maneuver commander. ~~It~~ AFIST works on the principle of centralized control and decentralized execution. This is accomplished by the introduction of an aerial fire support coordination center (AFISC) whose primary purpose is to control and coordinate all fire support assets to include attack helicopters. The center's design has it manned and equipped to accomplish its control and coordination mission from one aircraft. The center's usage is similar to that of the Air Force's air warning and control system (AWAGS) but with the AFISC operating well forward and at tree top level.

tree-top level.

Most of the techniques used in the study to facilitate control and coordination already exist in Army and Air Force tactical doctrine but have been modified to accommodate the AFIST concept. In the last chapter, brief offensive and defensive senarios are used to demonstrate the employment of the AFIST. The purpose of the study is to examine the AFIST concept as it pertains to the overall fire support optimization. The recommendation is that it should be further evaluated by computer simulations and field exercise.

TABLE OF CONTENTS

Dedicated To

Mrs. Ollie Meleta Hutchinson

1909 - 1979

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"There is still a tendency in each separate unit ... to be a one-handed puncher. By that I mean that the rifleman wants to shoot, the tanker to charge, the artilleryman to fire ... that is not the way to win battles. If the band played a piece first with the piccolo, then with the brass horn, then with the clarinet, and then with the trumpet, there would be a hell of a lot of noise but no music. To get harmony in music each instrument must support the others. To get harmony in battle, each weapon must support the other. Team play wins."

MG George S. Patton, Jr., 1941

THE AERIAL FIRE SUPPORT TEAM

Chapter 1

Introduction:

For twelve hours, the Division encountered increasingly heavy pressure by the Advance Guard of the Opposing Force (OPFOR). Then, at daybreak, the entire Division front was hit by a forty-minute artillery preparation with the majority of the fires being directed against US supporting Field Artillery, command posts, antiarmor weapons and 2nd Brigade positions. Closely following the preparation, the OPFOR struck at what they considered to be the weakest point in the US defenses. Although the enemy took heavy losses in both men and equipment, he continued to assault by continuously replacing each battered echelon from a seemingly inexhaustable source. After two hours of intensive combat, the OPFOR obtained a breakthrough in 2nd Brigade's area and began "shoving" his exploitation forces through the ever-widening gap. The Division Commander directed the Division Artillery Commander to blunt the nose and seal the base of the penetration while reserve forces prepared for the counter-attack into the flank of the penetration.

The Division Artillery Commander quickly briefed and

dispatched the Aerial Fire Support Center (AFISC) in a specially equipped helicopter to rendezvous with the 2nd Brigade Commander and his Fire Support Officer. Meanwhile, three Aerial Observation Teams and two helicopters which were to serve as retransmission stations were moved into preplanned positions. Tactical aircraft were alerted to provide continuous close air support once the OPFOR had moved into the "Kill Zone".

After the brief meeting with the Brigade Commander, the Aerial Fire Support Center with an experienced Fire Support Officer, Forward Air Controller (FAC), Attack Helicopter Liaison Officer, Intelligence Officer, Center Chief, and specially trained crew moved into position. Based upon the contingency plan, three Aerial Observation Teams controlled the fires of four General Support (GS) Artillery Battalions while the Ground Fire Support Teams continued to direct the fires of the Direct Support (DS) Artillery. By the time the AFISC was in position, all fire support means were ready.

The OPFOR reconnaissance elements passed through the area unaware of the trap that had been set. The artillery started the action by concentrating against the lead elements, and air defense weapons. As the enemy began to engage the TAC air, the attack helicopters identified and neutralized

the OPFOR air defense umbrella. Having difficulty in identifying and acquiring targets because of the simultaneous fires they were receiving, the enemy's armored vehicles and air defense weapons were forced to halt and eventually conduct a retrograde action. Two battalions of GS Artillery were shifted to seal the base of the penetration as attack helicopters and TAC Air continued to strike the armor forces along the entire flank of the penetration. After two hours of fighting, the OPFOR had lost the equivalent of one Tank Regiment.

Had this battle actually happened, one of the primary factors for US success would have been the well-trained Aerial Fire Support Team (AFIST).

Definition and Concept of the Aerial Fire Support Center and Aerial Fire Support Team. One of the elements of the AFIST is the Aerial Fire Support Center (AFISC) which consists of specially trained personnel who understand and can implement the Aerial Fire Support Team concept. The Team is located in one helicopter where they plan, request, coordinate and direct the combined efforts of the field artillery, attack helicopters, tactical close air support and, under certain situations, highly mobile armor-killer teams. The core of the Aerial Fire Support Center is the Fire Support Officer,

the Air Liaison Officer (ALO), Attack Helicopter Liaison Officer, Chief of the Center, and a specially trained aircraft crew. The center is the command and control element of the Aerial Fire Support Team. Other elements of the AFIST are dependent upon the team's task organization. Normally, a team consists of the AFISC, Field Artillery Aerial observers, aeroscouts, attack helicopter, close air support tactical aircraft, and support field artillery units. The aerial assets can also be integrated with ground forces, particularly armor-killer teams.

With certain applications of the advanced technological weapon systems that will be available in the near future and with minimum changes in tactical doctrine, the AFIST could theoretically be employed with the Covering Force and could attrite the opposing armored forces at a range of forty kilometers or more forward of the Main Battle Area (MBA). Under this defensive situation and prior to employment of the AFIST, the Division Commander and his staff would analyze the situation and plan where and when the AFIST and the Covering Force should be employed and prepare contingency plans. Preferably, the AFIST would be employed against the advancing OPFOR in a preselected "kill zone". This concept calls for a great deal of field artillery in support of the

AFIST. The tasks of the artillery would be a combination of suppressing, screening, and slowing the OPFOR armored columns. A key additional task would be to kill selected targets, particularly major air defense assets.

In the near future, with the development of the terminally guided projectiles (Copperhead), the Family of Scatterable Mines (FASCAM) and other improved munitions already in the inventory, the Field Artillery could accomplish the above missions and reduce the effectiveness of the OPFOR's air defense umbrella before the TAC Air and attack helicopters are committed. Of course, there are "real life" logistical and security problems associated with the use of artillery well forward of the MBA, and these must be lessened by the augmentation of ammunition transportation means, additional security forces and additional air defense assets.

Once the OPFOR's air defense umbrella is weakened, the attack helicopters and tactical air assets combined with the artillery would finish destroying the targets in the "kill zone". The engagements envisioned would be violent and short with large expenditures of munitions and heavy losses in OPFOR armored vehicles and personnel. The task organization of the AFIST, the sequence and combination of fire support means employment, and the situation will change.

However, the main function of the AFIST would remain to act as a coordinated, combined fire support team whose members complement each other while simultaneously engaging multiple armored targets.

Purpose of Thesis. The purpose of this thesis is to present the AFIST concept as it would be equipped in the 1985 time-frame. This concept and supporting ideas could be of value to both inter and intra-service efforts to integrate and control all aspects of fire support. The net product would be a better Opposing Force-to-Force "target service" ratio at a lower risk level to the force team members.

Hypothesis. The AFIST is a concept that should be further developed and employed by the US Army.

Assumptions.

(1) The helicopter will continue to survive on the mid-intensity conventional battlefield.

(2) The US Air Force will be able to establish, at least, air parity and local air superiority on the mid-intensity conventional battlefield.

(3) Technological developments that support the AFIST will proceed on schedule.

CLOSE AIR SUPPORT AND OTHER NEW SYSTEMS

Chapter 2

Section I

Before discussing how the AFIST is organized and functions, it is necessary to examine the principle components of the system which are Close Air Support, attack helicopters, field artillery and the Aerial Fire Support Center (AFISC). Each component will be examined for its capabilities, limitations, equipment, command and control and communications.

For simplification, the definition of close air support (CAS) is this study is air attacks against hostile targets that are in close proximity to friendly forces and that require detailed integration of each air mission with the fire movement of those forces. Normally these air attacks would take place short of the Fire Support Coordination Line (FSCL). During actual operation, the OPFOR would be engaged as deep as necessary in order to attack his entire Army 1st echelon even if the rear of the echelon was beyong the FSCL.

Field Manual 6-20, Fire Support in Combined Arms Operations, provides a concise listing of the capabilities and limitations

of tactical air forces. The following is a list of those relevant to the AFIST.

Capabilities:

1. High speed and long range. Tactical air firepower can be quickly shifted from point to point at short notice.
2. Versatility. Every target on the modern battlefield is vulnerable to the variety of weapon systems available to CAS. The strikes of CAS is particularly effective against hard and mobile targets.
3. Accuracy. Because of the newly developed weapon systems, first round hit probabilities are high.
4. Excellent Air-Ground Communications. There are two communication systems that support the Air-Ground Operations System (AGOS). These will be discussed under the subject of command and control.

Limitations:

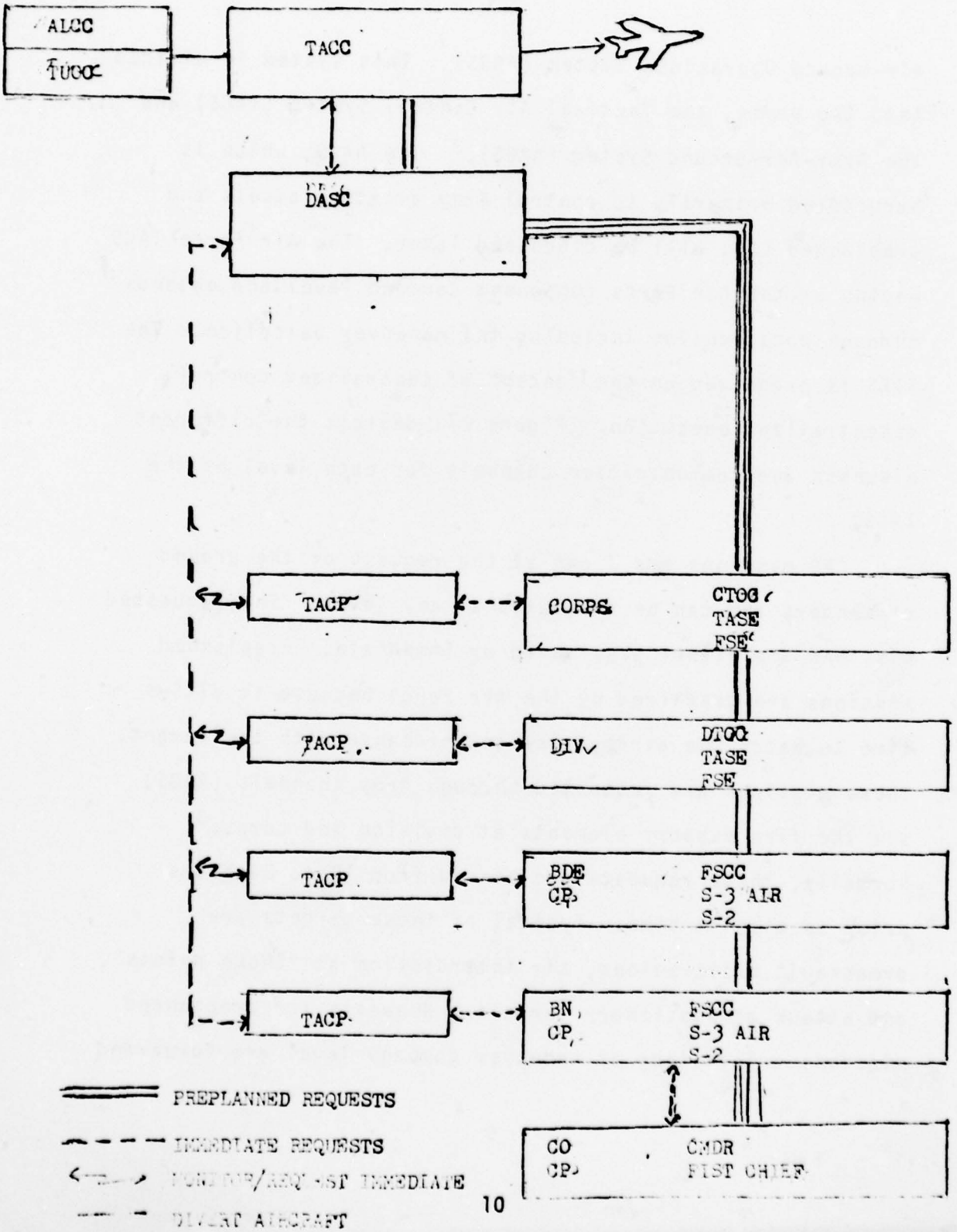
1. Availability of aircraft.
2. Delivery restrictions imposed by night and weather.
3. Delivery restrictions by enemy air defenses.
4. Time on station and delayed response.[1]

The command and control of CAS is accomplished by the

Air-Ground Operations System (AGOS). This system is divided into two parts, the Tactical Air Control System (TACS) and the Army-Air-Ground System (AAGS).[2] The AAGS, which is structured primarily to control Army aviation assets and preplanned CAS, will be discussed later. The Air Force TACS begins at the Air Force Component Command level and extends through each echelon including the maneuver battalion. The TACS is organized on the concept of centralized control, decentralized execution. Figure 2-1 depicts the different elements and communication channels for each level of the TACS.

CAS missions are flown at the request of the ground commanders and can be initiated at any level. The requested missions are either preplanned or immediate. Preplanned missions are preferred by the Air Force because it allows time to match the aircraft(s) and ordnance with the target. These missions are requested through Army channels (AAGS) via the fire support elements at division and corps.[3] Normally, these requests are needed from 12 to 24 hours prior to mission time. Typical of these targets are preassault preparations, air interdiction at "choke points", and attack of stationary targets. Requests for preplanned missions originating at maneuver company level are forwarded

Fig.2-1. Immediate and Preplanned Request Channels



to the battalion FSE over the battalion command net, the fire direction net, or any other means available.

At battalion, the S-3 air, the Fire Support Officer (FSO), and the Air Liaison Officer (ALO), who is chief of the Tactical Air Control Party (TACP), review the request. If the analysis reveals that the requests should be honored, the S-3 air adds the request to his list. Before a specified "cut-off" time, he submits the updated list which has been prioritized to the Brigade FSE over the brigade operations/ intelligence net. The Brigade FSO, S-3 air, and ALO integrate the request with those maneuver battalions, eliminate duplications, assign priorities and forward the requests to the Assistant G-3 for CAS operations at the division's main command post.[4]

Basically, the same process is accomplished at Division level and the approved requests are forwarded to the Army liaison element at the Air Force Tactical Air Control Center (TACC) who, after consolidation of all requests by the Army, fulfills the requirements in accordance with the priorities established by the Army. Obviously, the primary shortcoming of this method is that it is too slow to respond to targets of a highly mobile OPFOR. However, it will be shown in a later chapter when the employment of the AFIST concept is

discussed, preplanned missions in a modified version do have a place.

The second type of CAS request, the immediate, comes from the support ground commander to fulfill urgent requirements. The processing of these requests is accomplished through Air Force channels and works in the following manner. A mission that originates at maneuver company level is forwarded to the battalion FSE by the same process as for the preplanned request. At battalion, the FSE and S-3 air examine and validate the mission. It should be noted that the maneuver company has the ability through the chief of the Fire Support Team to choose the best method to engage the target. If the request is granted, the TACP forwards it directly to the Direct Air Support Center at the Corps Tactical Operations Center (CTOC) over the Air Force air request net. Intermediate levels acknowledge the request and have a predetermined time period, usually five minutes, to disapprove the mission. If the request is not disapproved, the DASC orders the mission flown. Depending upon the location of the aircraft, the response time may vary from five minutes for aircraft on air alert to thirty minutes for aircraft on ground alert. Normal procedure calls for both preplanned and immediate close air support missions to be controlled in the same manner, once launched.

A Control and Reporting Post (CRP), a Control and Reporting Center (CRC), and a Forward Air Control Post (FACP) direct the attacking aircraft to a designated point. Control is then passed to the Forward Air Controller (FAC) who normally directs the attacking aircraft onto the target.

There are many ways that the attack pilots can acquire the target. These include vectoring by the FAC, marking by airborne ordnance, following the path of another aircraft, keying off other aircraft (especially helicopters), marking by smoke or other ordnance, fire from direct or indirect fire surface weapons, observing ground marking panels, terrain reference, precision radar, laser designation, or a combination of these means.

Current doctrine states that normally an Air Force FAC will be available to control CAS mission.[5] However, to insure that urgent or emergency requirements for FACs are satisfied, procedures should be established to accomplish such missions without on-the-scene direction and control by a FAC. Presently doctrine allows that only in an emergency will targets be identified and marked by an individual who is not a qualified FAC.[6]

Many people have the opinion that FACs will not be readily

available on the modern battlefield. There are two excellent alternatives to an Air Force FAC. Although the Air Force FAC is preferred, the Army aerial observers and forward observers can be excellent controllers if properly trained. Because of the sophisticated air defense assets of the OPFOR, FACs will probably be either on the ground or in aircraft at tree-top level. Thus the Vietnam-era FAC flying 1,000 feet above ground level (AGL) is no longer acceptable. This study does not propose changes to the FAC concept, but when the AFIST is deployed, it will be assumed that the aeroscouts and aerial observers are qualified FACs.

Now, it is necessary to examine the Air Force weapon systems that can support the AFIST. Because the A-10 Thunderbolt is the only Air Force aircraft that has been built specifically for CAS, it will be the Air Force's representative delivery system for this study.[7] The A-10 offers a unique combination of large payload, long loiter time, "stand-off" armor killing capability, and wide combat radius, which are all desired characteristics of any aircraft operating as part of the AFIST. It can carry up to 16,000 lbs. of mixed ordnance with partial fuel or 12,086 lbs. of ordnance with full internal fuel.[8] The 30mm GAU-81A can fire 2,100 or 4,200 rounds per

minute and can defeat both soft and hard targets including tanks.[9] Coupled with the AGM-65 Maverick missiles and the 30mm gun, the A-10 can operate at a range of 228 miles, deliver 9,500 lbs. of weapons, loiter 1.5 hours and return to base with 20 minutes of reserve fuel.[10]

This aircraft was designed to survive above the modern battlefield. Although the survivability credentials of the aircraft are impressive, it must do more than return. It needs to be able to "turn-around" to support other missions. Damage to the aircraft must be minimized by the use of good intelligence and good tactics. If the situation dictates, the A-10 can be deployed into forward staging areas. Its high floatation tires and elevated engines combined with its thrust-to-weight ratio enable it to operate from a minimally prepared air strip of 2,000 feet or less.[11] The current production A-10 does not have night and adverse weather capability. However, Fairchild Republic Company has designed the A-10 evaluator prototype to extend significantly the operational capabilities of the aircraft type in an environment like that in Northern Europe.[12] The Air Force may begin evaluation of the aircraft on 1 October 1979.[13] Three wings of A-10s, each with four squadrons of 18 aircraft apiece will be deployed to Europe in 1979.[14]

This section has discussed one of the four basic components of the AFIST, the Air Force CAS aircraft and CAS system. For the first time, the Air Force has an aircraft specifically designed for the CAS role which possesses multiple armor killing capabilities. Like all weapon systems, the A-10 can be defeated unless it is integrated with other weapon systems.

Chapter 2

Section II

When the AFISC is discussed in Chapter 4, a key component of the center is the data link with a new airborne radar known as Stand-off Target Acquisition System (SOTAS). The radar will provide deep standoff capability in a combat environment saturated by intense Electronic Counter Measures (ECM). It incorporates technology developed for the F-16, Electronically Agile Radar (EAR), and Airborne Warning and Control System (AWACS) radar programs.[15] Much of the capability of the system is classified but it will perform the role assigned to it by this study in Chapter 4.

By the mid 1980s, a variety of automated systems will be fielded to provide large volumes of information to key battlefield decision makers. These include the executive system (TOS) and supporting control systems as well as necessary secure voice and data communications. This capability is currently projected to exist at the various ground command posts, but has not been adequately solutioned to provide continuity of operations for key personnel moving

in the battlefield by Army aircraft. In April 1979, the Control, Intelligence and Communication Directorate, Combined Arms Combat Development Activity began to study the problems associated with equipping a command and control aircraft with a system that would interface with TOS and would satisfy the other requirements associated with the functions. Many aspects of the study are not ready for release at this time, but the results will indicate that the technology does exist or will by 1985 to field a command and control aircraft. The Aerial Fire Support Center discussed in this thesis is a similar approach but is oriented toward fire support coordination.

ENDNOTES

1. Department of the Army, Fire Support in Combined Arms Operations, FM 6-20 (30 September 1977), p. D2-D6.

2. Department of the Army, The Air-Ground Operations System, (AGOS), FM 100-26 (Mar 1973), p. 5-1.

3. Department of the Army, Fire Support in Combined Arms Operations, p. D-11.

4. Ibid.

5. US Army Command and General Staff College, U.S. Air Force Basic Data, RB 1 10-1 (July 1978), p. 5-14.

6. Ibid.

7. US Army Command and General Staff College, U.S. Air Force Basic Data, p. A-8.

8. Ibid.

9. Ibid.

10. Ibid.

11. Major Michael L. Ferguson, "A-10 Close Air Support Stone" Infantry (May-June 1976), p. 26.

12. "Adverse-Weather A-10 to be Evaluated," Aviation Week and Space Technology, (30 April 1979) p. 157.

13. "Adverse-Weather A-10 to be Evaluated," p. 158.

14. US Army Command and General Staff College, U.S. Air Force Basic Data, p. A-8.

15. "Radar is Key to SOTAS Performance," ARMY (October 1978) p. 135.

ATTACK HELICOPTERS AND FIELD ARTILLERY

Chapter 3

Section I

The purpose of this chapter is to discuss two more components of the AFIST, the attack helicopter and the field artillery. In Section 1, the organization, employment, weapon systems, and command and control of attack helicopter assets will be examined. Attack helicopter units are organized primarily to destroy tanks and other armored vehicles. They may fight as an air cavalry combat brigade (ACCB), or may be attached or placed under the operational control of a division, ground combat brigade or an armored cavalry regiment. Command and control at battalion level is exercised in the same manner as with other battalions. A command post is normally established consisting of the primary staff, fire support coordination personnel, and necessary liaison personnel. The commander may operate either from the command post or from an aircraft. The communication channels for the ground elements are basically the same as other battalions.

The attack helicopter company is the fighting element

of the battalion. During tactical operations, the commander positions himself where he can best influence the action. The company usually controls its combat operations through its flight operations and platoon leaders. Team leaders control the individual maneuver elements of the platoons.

Each team consist of two basic components, the aeroscouts and the attack helicopters. According to FM 17-50, Attack Helicopter Operations, dated 1 July 1977, the primary mission of the aeroscout is to see the battlefield, acquire targets, and coordinate movement of attack helicopters. Its functions are:

1. Coordinate the mission and assets available; and determine friendly and enemy situations.
2. Coordinate as necessary with the ground commander responsible for the operational area, most often the company team or battalion task force commander.
3. Acquire and identify targets; and render reports.
4. Confirm or select positions that provide concealment and stand-off target to attack helicopter.
5. Assist attack helicopter movement into battle positions.
6. Hand-off target to attack helicopter.

7. Provide local security to attack helicopter.

8. Request and adjust indirect fires and tactical air as directed.[1]

The attack helicopter is the "muscle" behind the aeroscouts. They primarily destroy tanks and other armored vehicles located by the aeroscouts and other sources. The attack helicopter unit needs several means to increase its effectiveness and survivability. First they need suppressive fires, screening and electronic warfare to reduce the effectiveness of the OPFOR air defense systems. Most of this support would come from the field artillery and tactical air. Second, the aircraft should strike from covered and concealed positions at maximum stand-off range. Once a position is revealed, the aircraft should move to supplemental locations. In the same sense, the thrust of the attack should be multidirectional. Third, all aircraft flight is conducted below the scan of the OPFOR radar. This may involve nap-of-the-earth flight, contour flight or low level flight depending on the distance from the OPFOR screening terrain and the sophistication of the OPFOR air defense system. Fourth, overwatch positions are effective in detecting and destroying OPFOR ADA assets as they engage attacking helicopters or tactical air.

Lastly, sustained fire on the OPFOR is usually accomplished by the ONE-THIRD Rule. As an element is attacking, the second element is enroute, and the third is at the Forward Area Rearm and Refuel Point (FARRP). Normally, a FARRP is established by each attack helicopter company.

Attack helicopters should be employed in mass, preferably in battalion strength but not less than company strength.[2]

The effectiveness of these units is greatly reduced by severe weather and open terrain. When visability is reduced to less than one-half mile, the attack helicopter loses its stand-off capability. The present generation of helicopters is also considered soft targets. Another important limitation is crew endurance because operations at low flight levels under combat conditions are fatiguing and current table of organizations do not provide back-up crews.

Attack helicopter battalions are found in the ACCB, are assault division, and at Corps. They are each organized with three attack helicopter companies and a headquarters company. In addition, most divisions have or will soon have one or more organic attack helicopter companies. These companies are organized with three attack helicopter platoons, each with seven AH-1S TOW Cobras, and a scout helicopter platoon with twelve OH-58A scout helicopters. When the YAH-64

Advanced Attack Helicopter is introduced into the inventory, the unit organization will probably be similar but with fewer aircraft.

The current model of attack helicopter is the AH-1S. It is a tandem-seat, two-place helicopter armed with eight TOW missiles and a configuration of 2.75" rockets, 7.62 minigun and 40mm grenade launcher. The turret of the AH-1S is scheduled to be converted beginning in FY 79 to accept the 20 or 30mm cannon which is effective against lightly armored vehicles.[3] The AH-1S can operate 2.5 hours. The AH-1S is a sophisticated helicopter with programmed modification through 1982 which will give the aircraft further survivability characteristics on the modern battlefield.[4]

The YAH-64 advanced attack helicopter, which should reach the field in 1983, is the new generation of attack helicopter. Like the AH-1S, it is a tandem-seat, two-place helicopter designed to kill armored targets. It has greater weapon capability, survivability, and 24-hour operational ability.[5] Its ordnance load will be as many as 16 Hellfire antitank missiles, up to 76 2.75" rockets or up to 1,200 rounds for its 30mm cannon or several combinations of each.[6] It is capable of operating 1.9 hours before refueling.[7] Both aircraft will be part of the Army's antiarmor force through

the 1980s.

The improved 2.75" rocket system is currently being developed. The new system includes a new fire control system, improved munitions and an improved motor that gives the rocket a range of 6,000 meters.[8] This system will give the pilot the capability to select the type rocket(s) he desires to fire and then, if necessary, to select the fuze setting.[9] With these improvements, the attack helicopter can fire 2.75" rockets in the indirect fire mode from ranges of 6,000 meters with good accuracy.

Both the aerial TOW and Hellfire missiles are designed to defeat the tank. Basically, the TOW is a wire-guided missile with a range of 3,750 meters. The Hellfire, which will arrive in the field in 1980, is laser guided. Once fired, the missile homes in on the target as it is designated with a laser device either from the aircraft that fired the missile or from another source. The Hellfire has a greater range than the TOW and both systems are highly accurate and reliable.

The OH-58A is a four-place, light observation helicopter designed for the aeroscout role. It will normally be manned by a pilot and a co-pilot/observer. It has the ability to remain on station up to 2.5 hours. Congress has appropriated funds for investigation into developing a new observation

helicopter but there is no programmed time when a new aircraft will reach the field.

This section has briefly discussed the organization, employment, weapon systems, capabilities and limitations of attack helicopters, heavily relied on to be one of the combat multipliers on tomorrow's battlefield. With its stand-off capability, high probability of first round hits, mobility, and ability to stay under the OPFOR's air defense umbrella, the attack helicopter teams can inflict severe losses on the enemy in a short period of time. In addition to its limitations, it is vulnerable to artillery fires, ground air defense weapons, and aircraft, particularly helicopters such as Soviet MI-24 HIND. The YAH-64 will provide greater capabilities and lessen the vulnerabilities/limitations. However, as with CAS, the attack helicopters' survivability and effectiveness will require that it be integrated with mutually supporting weapon systems.

Chapter 3

Section II

The mission of the field artillery is to destroy, neutralize, or suppress the OPFOR by cannon, rocket, and missile fire and to integrate all supporting fires into combined arms operations.[10] Responsiveness, flexibility, and effectiveness dictate that the field artillery is the maneuver company's primary means of fire support.[11] At each level of command beginning at company, there is a field artillery officer whose primary duty is to serve as the fire support coordinator (FSCOORD). Figure 3-1 depicts the fire support coordination facilities and FSCOORDs at each level through Corps. The duties of the FSCOORD varies at each level, but basically he performs the functions of planning, directing and coordinating all aspects of fire support to include field artillery, mortars, CAS, chemical fires, nuclear fires, and fire coordination measures. The field artillery units are organized to support the field artillery needs of the maneuver units, to acquire targets, and to provide counterbattery fires.

MANEUVER ECHELON	FIRE SUPPORT FACILITY	FSCOORD	ASSISTED BY
Co/Trp	FIST	FIST Chief	Sr Fire Support SGT
Bn/Sqdn	FSE	FSO	Fire Support SGT
Bde	FSE	DS FA Bn Cmdr	Bde FSO
Regt	FSE	FSO	Asst FSO
Div	FSE	Divarty Cmdr	Asst FSCOORD
Corps	FSE	Corps FA Officer	Asst FSCOORD

Source: Department of the Army, Fire Support in Combined Arms Operations, FM 6-20 (30 September 1977) p. 3-4.

Fig. 3-1. Fire Support Coordination Facilities and FSCOORDs

A typical battalion is organized into Headquarters and Headquarters Battery, three firing batteries and a service battery. Figure 3-2 illustrates the FA organizations and weapons by division type. Particular attention should be paid to the FA cannon brigades. These will normally augment the artillery of the divisions.[12] This is done either by attaching the brigade to the division or by giving it a reinforcing mission to Division Artillery (DivArty). At division level, the organic DivArty provides the field artillery.

Tactical control of FA is accomplished by organizing the FA for combat and by giving it a tactical mission. The standard missions are direct support (DS), reinforcing (RI), general support - reinforcing (GSR), and general support (GS). Each standard mission has seven inherent responsibilities associated with it. These are outlined in Figure 3-3.

The four standard tactical missions can be varied by changing one of the inherent responsibilities. The command relationship is usually formed by assignment, attachment or by placing the artillery unit under the operational control of another element. By use of the command relationship,

TYPE WPN	CANNON				
	105(T)	155(T)	155(SP)	8"(SP)	175(SP)
NO WPNS PER BN	18	18	18	12	12
MECH/ ARM DIV			3 Bn	1 Bn	
INF DIV	3 Bn	3 Btry		1 Btry	
ABN DIV	3 Bn				
AMBL	3 Bn	1 Bn			
SEP MECH/ ARM BDE			1 Bn		
SEP INF/ ABN Bde	1 Bn				
ARMD CAV REG			3 Btry		
FA BDE	Up to six battalions. Variable mixture by caliber and mobility based on misson.				

Source: Department of the Army, Fire Support in Combined Arms Operations, FM 6-20(30 September 1977) p. 3-24.

Fig.3-2. FA Organizations and Weapons- By Division and Type

A.. FA unit with a mission of-	Direct Support	Reinforcing	General Support Reinforcing	General Support
1. Answers call for fires in priority from.	1. Supported Unit 2. Own Observers 3. Force FA HQ	1. Reinforced FA Unit 2. Own Observers 3. Force FA HQ	1. Force FA HQ 2. Reinforced FA Unit 3. Own Observers	1. Force FA HQ 2. Own Observers
2. Has as its zone of fire-	Zone of action of supported unit.	Zone of fire of reinforced unit	Zone of action of supported unit to include zone of fire reinforced FA unit	Zone of action of supported unit
3. Furnishes FISTs	FIST to each maneuver company	No Requirement	No Requirement	No Requirement
4. Furnishes FSO/LO	FSO to each maneuver battalion and brigade of the supported unit	LO to reinforced FA unit HQ	LO to reinforced FA unit HQ	No Requirement
5. Establishes Communications with-	FIST chiefs, FSO's, and supported maneuver unit	Reinforced FA unit HQ	Reinforced FA unit HQ	No Requirement
6. Is positioned by-	DS Artillery unit or as ordered by force HQ	Reinforced FA unit or as ordered by force FA HQ	Force FA HQ or reinforced FA unit if approved by force FA HQ	Force FA HQ
7. Has its fires planned by-	Develops own fire plans	Reinforced FA Unit HQ	Force FA HQ	Force FA HQ

Source: Department of the Army, Fire Support in Combined Arms Operations, FM 6-20 (30 September 1977) p.3-28.

Fig.3-3. Inherent Responsibilities associated with tactical missions of FA

standard missions and non-standard mission, the field artillery can be tailored to the tactical situation. In this same way, it can support the AFIST.

As with CAS and attack helicopters, it is necessary to examine the capabilities and limitations of the field artillery. According to FM 6-20, Fire Support in Combined Arms Operations, these are:

1. Provide fire support under all conditions of weather and types of terrain.
2. Shift and mass fires rapidly without the requirement to displace.
3. Add depth to combat with long range fires.
4. Fire a variety of conventional shell/fuze combinations.
5. Deliver nuclear and chemical fires.
6. Provide continuous support by judicious displacement.
7. Be as mobile as the support unit.

The limitations as listed in FM 6-20 are:

1. Limited self-defense capability against ground and air attack.
2. Limited ability to destroy point targets without considerable ammunition expenditure. (This limitation

will be removed with the introduction of terminal guided projectiles.)

3. Firing signatures makes it vulnerable to detection by enemy target acquisition assets.[13]

Other limitations that are not listed in FM 6-20 but which will have a significant effect on field artillery operations are the availability of ammunition both in type and in quantity, and the dependence of field artillery upon radio communications to request and adjust fires during fluid operations. This communication vulnerability will be lessened by use of the Digital Message Device (DMD), soon available to aeroscouts and aerial observers.

Response time for fires to impact vary from 30 seconds for weapons already layed on targets to several minutes for the massed fires of a battalion. This rapid response time will be reduced in the case of massed fires when TACFIRE or components of TACFIRE are operational.

New Developments

TACFIRE

The Tactical Fire Direction System (TACFIRE) represents a major advance in the FA's capability to perform its fire

support planning and coordination role. The TACFIRE system is composed of central computer and computer access remote terminals. As mentioned before, the DMD, which is the remote terminal for the AFISTs aerial observers and sound and flash personnel with the DivArty target acquisition battery to input fire missions and battlefield intelligence, is the component of TACFIRE that will be considered for use by the AFIST members. Although the DMD compresses the transmission time of the call for fire into a few seconds, it is not a classified or secure system. The capture of the DMD and a computer system to receive the transmission would compromise the system. The advantages of the DMD is short transmission time and a direct link with the computer system. In the case of aerial observers, the call for fires are normally transmitted directly to the FA battalion computer. The short transmission times lessen the chance of the OPFOR locating the AO. TACFIRE was successfully tested by the Army in Operation TEST III (OTIII) at Fort Hood, Texas in January 1978.[14] The system will be introduced into the field in the early 1980s.

Laser Rangefinders and Designators

The AN/GVS-5 laser rangefinder is battery-powered,

resembling a large pair of binoculars, and gives the operator the ability to accurately determine ranges to within a few meters. With the rangefinder, the aerial observer can accurately locate the target and also the initial adjusting round which will facilitate rapid massed fire-for-effect. The laser locator designator is designed to illuminate a target by means of laser reflection in order that a laser-seeking projectile can guide itself to the target. The designators are in the advanced development phase and have had preliminary testing. To facilitate multiple target engagement, the designator will have the capability to vary their signal pulses in order that each designation will be different.

Cannon Launched Guided Projectiles

The most revolutionary of the major developments in munitions is the XM712 (Copperhead) which is the first artillery-developed munition which has the ability to guide itself and destroy moving, hard point targets with a high degree of reliability and economy. The system is dependent on target designation by a pulse-coded laser source such as the laser locator designator. Thus, for the first time, the

FA will be able to effectively and economically destroy the OPFOR tanks in the indirect fire mode. The first rounds of Copperhead are scheduled to be in the field in 1980. Continued development of the guided munition concept includes other sensing modifications such as antiradiation projectiles, infrared (IR) sensure, and the millimeter wave (MMW) radar sensure systems. These are further sophistications of the cannon-launched guided munition concept and will be available in the late 1980s. The advantage to these improvements is that the target will not need to be designated by the locator laser range finder.

Family of Scatterable Mines

FASCAM

FASCAM can be delivered by helicopter, the 155mm Howitzer, ground vehicles, rockets and high performance aircraft. Depending on the system, these can be antipersonnel or antitank. By use of FASCAM, the OPFOR can by slowed and canalized, thus causing him to remain in the "kill areas" longer with exposed flanks. Because the mines can be emplaced by field artillery, there is minimal risks to the delivery system.

Dual-Purpose Improved Conventional Munitions

DP-ICM

The Dual-Purpose Improved Conventional Munitions (DP-ICM) are munitions that are composed of many small "bomblets" each of which can inflict damage. The field artillery can saturate an area in one volley with a high probability of a target-hit. A drawback to this system is relative high cost. For instance, given accurate target location, it could cost approximately $45,000 to destroy an armored personnel carrier while Copperhead could do it for approximately $10,000.[15]

Remotely Piloted Vehicle

RPV

The RPV is a remotely-piloted airborne reconnaissance, surveillance and target acquisition system that is designed to perform the following missions:

1. Real-time surveillance
2. Laser target designation
3. Photographic reconnaissance
4. Target location and artillery adjustment
5. Target acquisition

The current system being tested by the FA is Aquila

(XMQM-105) manufactured by Lockheed Missiles and Space Company, Incorporated.[16] It has a range of 275 (km) and endurance time of 157 minutes.[17] Because of its relative small size, and electronic countermeasures, the RPV can overfly the target area, relay back real-time combat information, and return to a recovery point. By relaying this information to the Aerial Fire Support Center, the center could integrate the combat information into the operation of the AFIST.

Other FA Developments

The FA has several developments that are designed to increase the initial round accuracy of the firing batteries without having to first register. Among these is the Field Artillery Meterological Acquisition System (FAMPS) which will provide accurate timely meterological data. Another is the position and azimuth determining system (PADS). By using an inertial navigation device, the system can provide the FA batteries with immediate survey data. In other words, a helicopter with PADS need only land at each battery position to provide it with accurate orienting data. Another device, the FA Projectile Velocimeter can measure each artillery

piece's muzzle velocity. It is battery-operated and light weight, and each battery will be issued one by 1979. The net result of these developments and TACFIRE is that by the early 1980s, the field artillery will be able to deliver rounds quicker and with greater accuracy.

The intent of this section has been to give an overview of the FA organization, capabilities, limitations, operations, and new developments. With its many capabilities, the field artillery will be able to augment and compliment the attack helicopter and CAS.

ENDNOTES

1. Department of the Army, Attack Helicopters Operations, FM 17-50 (1 July 1977), p. 4-1 thru 4-2.

2. Department of the Army, Attack Helicopters Operations, p. 3-2.

3. "Bell's AH-1S Modernization Program: Readying Now for the 1980's," Army Aviation, Vol. 27-7 (31 July 1970) p.59.

4. Ibid.

5. Eric C. Ludvigsen, "1978 Weapons Directory," Army (October 1978) p. 170-171.

6. Ibid.

7. Ibid.

8. "Improved 2.75 inch Rocket System," (Prepared by the Office of the Project Manager, Huntsville, Alabama) p. 42.

9. "Improved 2.75 inch Rocket System," p. 1-45.

10. Department of the Army, Fire Support in Combined Arms Operations, FM 6-20 (30 September 1977) p. 3-21.

11. Ibid.

12. Department of the Army, Fire Support in Combined Arms Operations, p. 3-26.

13. Department of the Army, Fire Support in Combined Arms Operations, p. 3-25.

14. Craig Leyda, LTC, "The First Team and TACFIRE," Fld Arty J (January-February 1978) p. 24.

15. Ibid.

16. "U.S. Army Aquila Remotely Piloted Vehicle (RPV) Program," (Prepared by Lockheed Missiles and Space Co., Inc.) p. 2.

17. "Standard Aircraft Characteristics XMQM-105 (ACQUILA)," (Lockheed Missiles and Space Co., Inc.) p. 3.

18. Department of the Army, Fire Support in Combined Arms Operations, p. 8-6.

THE AERIAL FIRE SUPPORT CENTER*

Chapter 4

Section I

The Aerial Fire Support Center (AFISC) is the planning and control element of the Aerial Fire Support Team. As mentioned before, the center would operate on the principle of centralized control and decentralized execution. In this way, the combined effectiveness of the elements would be increased without the loss of flexibility and individual initiative. It is important to note that the center does not command the individual elements but does have overall operational control of them when they enter the area of operation of the AFIST. The center would actually be similar to the command and control aircraft familiar to most military men but would have much greater capabilities. The center would have four basic functions: (1) assemble combat intelligence/information, (2) coordination of all fire support

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*The Aerial Fire Support Center discussed in this section is a proposal to provide a "nerve center" for the AFIST. The proposed functions, positions and equipment requirements are based upon the experience and research of the author. At the present time, there is no program to develop this type of center.

means, (3) control of all fire support elements utilized in the area of operation, and (4) management of airspace below the coordination altitude in the area of operation (AO). Each of these functions are explained below.*

The first function of assembling combat intelligence and information is critical to the success of the AFIST. What the center needs to know is where the opposing force's armored vehicles, tanks, air defense weapons, close air support aircraft and helicopters are located and what their intentions are. Thus, combat information on a "real-time" basis must be fed into the center. The concept here is similar to that of the Air Force's Airborne Warning and Control System (AWACS). The radar technology for such a system already exists in the Stand-Off Target Acquisition System (SOTAS), which was discussed in Chapter 2. The SOTAS can provide the disposition of the opposing force's armored

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*Before discussing the other functions of the center, it is necessary to explain the meaning of some of the terminology. First, the CAS, artillery and attack helicopters are referred to as the three fire support elements of the AFIST. Second, the field artillery, fire support officer, the air liaison officer, and the liaison officer with the attack helicopter element are all considered fire support coordinators when they are members of the center. For the purpose of this paper, attack helicopters are considered to be fire support means.

columns and air assets within the range of its capability. The center needs to know this critical information in order to formulate the best course of action as to how the OPFOR should be attacked. A second point of equal importance is that the center needs an early warning system so that it can take the necessary actions to counter the air threat presented by the OPFOR. Local air superiority by both fixed-wing and rotary-wing aircraft is needed over the AO of the AFIST. The fixed-wing air superiority is basically a responsibility of the Air Force. However, in a recent article published in the Military Review entitled "Air Superiority in the Treetops", Lieutenant Colonel Retsae Miller points out that the area from surface to 100' above ground level may be contested by Soviet helicopters.[1] The current Soviet helicopter designed for the attack role is the MI-24 HIND-D which could possibly have a radar controlled 30mm cannon available for use in air-to-air combat.[2] The early warning provided by a system such as SOTAS that could directly provide information to the center would not only warn the center that an OPFOR helicopter thrust was coming, but would also enable it to take measures to counter the threat while the remaining AFIST continued its mission. In this

and most other instances, the time available to react will be only minutes. This is why it is imperative that the center receive "real-time" or "near real-time" relative combat information.

The next function is the overall coordination of fire support means. Why the concern for overall fire support coordination? The answer can be found in the purpose of the center, which is to optimize the effectiveness of each weapon system as well as to optimize the combined effect of the systems. Tacticians are aware of the "multiplier effect" that can be obtained in the battlefield by such factors as improvements in weapons, attack helicopters, and surprise. How the multiplier works with the AFIST is even more impressive. Here is an example. Attack helicopters by themselves are a lethal weapon system but their effectiveness is limited by the OPFOR's air defense system and by the evasive actions of the targets. By introducing artillery support with its FASCAM, terminally guided munitions, and improved conventional munitions, the effectiveness of the attack helicopters can be increased in proportion to the success of the artillery. Assume that both the mobility and lethality of the OPFOR's air defense system is reduced by 50 percent. The effectiveness

of artillery increases the effectiveness of the attack helicopters which both in turn increase the effectiveness of CAS. This increase in effectiveness is also working both ways or, in other words, the CAS is increasing the effectiveness of the attack helicopters. This point could be put into a formula. Let

C = CAS effectiveness

A = Artillery effectiveness (Note that because of the time frame of the study when "Copperhead" and adequate DP-ICM munitions are available, field artillery will be considered an effective weapon against armor.)

H = Attack helicopter effectiveness

E = Summation of effectiveness, each element acting independently

Initially, each level of effectiveness for each weapon system would be expressed in combat strength points. The sum of the effectiveness of each acting independently would be expressed as $E = C + A + H$. With each system <u>continually</u> making the other more effective by working as a team, the combined effectiveness would approach the formula

$$E_0 = M_1C + M_2A + M_3H$$

where M_1, M_2 and M_3 are the maximum multipliers possible. This would be a situation where the OPFOR has no air defense umbrella or mobility. As stated before, each multiplier would

be constantly increasing in value approaching its optimal value. A numeral example would further demonstrate the increased effectiveness.

Assume the following combat strength points for each independent fire support means for one period of time:

$C = 10$

$A = 10$

$H = 10$

Thus, the total effectiveness (E) would be 30. Now, assuming the multiplier effect and given each multiplier a value, the computed combat strength points would be:

$M_1 = 3$

$M_2 = 1.5$

$M_3 = 2$

E_0 = total effectiveness with multiplier applied.

$$E_0 = (3 \times 10) + (1.5 \times 10) + (2 \times 10)$$

$$E_0 = 30 + 15 + 20$$

$E_0 = 65$ combat strength points

This is an increase in effectiveness of more than 100 percent. Extending the formula over a period of time introduces another multiplier. Thus the formula becomes:

$$E_{to} = t_1 M_1 C + t_2 M_2 A + t_3 M_3 H$$

where t_1, t_2 and t_3 are the multipliers associated with

multiple periods of time for each element due to a decrease in losses. An example of this is the effect that the loss of one A-10 would cause in allocations. If the aircraft was lost on its first mission, and it could have flown four sorties per day, the three remaining sorties would, of course, be lost. Thus, for simplicity, assume that the loss rate was 50 percent during the first flight of the day and the first flight consisted of four aircraft. Sixteen individual sorties would have been expected if no losses were received. If by acting independently and with a rate loss of 50 percent, the number of sorties available the first day is reduced by 50 percent. The sorties now available to be flown would be twelve or a multiplier of 1.5. This would be included as part of the multiplier (M) for that particular element. However, this loss when carried to the next time periods create another multiplier which is being termed (t). By assuming values for the multipliers t_1, t_2 and t_3, the combined effectiveness over more than one period of time, E_{to} is increased as illustrated by the formula:

$$E_{to} = t_1 M_1 C + t_2 M_2 A + t_3 M_3 H$$

$$= (1.5 \times 3\ 10) + (1.5 \times 1.5 \times 10) + (1.5 \times 2 \times 10)$$

$$= 45 + 21.25 + 30$$

$$= 96.25 \text{ or } 96 \text{ combat strength points.}$$

This is an oversimplification, but the concept remains logically valid. In the conclusion of this paper will be a recommendation as to how to determine what the exact multiplier effect would be given different senarios.

It will take a trained and well equipped AFISC crew to handle the fire support coordination function but in order to achieve the optimal combined effectiveness of the AFIST, it must be done.

In a complex and rapidly developing tactical situation, the only way to accomplish fire support coordination is to follow two basic principles. Figures 4-1 and 4-2 list the fire support coordination measures currently being used. The principles that govern this function are (1) to keep the measures as simple as possible and (2) to allow each fire support means the maximum flexibility possible. An example of how this could be accomplished is depicted in figure 4-10. In this example, the areas near the mass of OPFOR armored columns are free fire areas (FFAs) and the immediate adjoining area where aircraft are operating are restricted fire areas (RFAs).*

The use of these fire support coordination measures have been modified to fit the AFIST concept and are not current doctrine.

[illegible] FIRE AREA (RFA) An area in which specific restrictions are imposed and into which fires that exceed those restrictions will not be delivered without coordination with the establishing headquarters. *Purpose*—To regulate fires into an area according to the stated restrictions.	Battalion or higher; or independently operating company.	On identifiable terrain, by a grid or a radius (M) from a center point.	Through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units.
NO FIRE AREA (NFA) An area in which no fires or the effects of fires are allowed. Two exceptions include: 1. When establishing headquarters approves fires (temporarily) within NFA on a mission basis. 2. When an enemy force within the NFA engages a friendly force, the commander may engage the enemy to *defend his force.* *Purpose*—To prohibit all fires or their effects into an area without prior clearance.	Division or corps in concert with host nation.	On identifiable terrain, by a grid or a radius (M) from center point.	Through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units.
RESTRICTIVE FIRE LINE (RFL) A line established between converging friendly forces (one or both may be moving) that prohibits fires or effects from fires across the line without coordination with the affected force. *Purpose*—To prevent interference between converging friendly forces.	The common commander of the converging forces.	On identifiable terrain usually closer to the stationary force.	Through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units.
AIRSPACE COORDINATION AREA (ACA) A block of airspace in the target area in which friendly aircraft are reasonably safe from friendly surface fires. It may occasionally be a formal measure (a three dimensional box in the sky). More frequently, it will be informal (e.g., "keep the FA and NGF north of GREEN RIVER, CAS to the south.").	Brigade or higher level commander.	Above the target as recommended by the ALO. Size to be dictated by type aircraft and ordnance.	Through both maneuver and fire support channels to higher, lower, and adjacent headquarters and supporting units. Information includes minimum and maximum [illegible] length (2 [illegible]) width, effective DTG.

Source: Department of the Army, Fire Support in Combined Arms Operations, FM-6-20 (30 September 1977) p. H-14.

Fig. 4-1. Restrictive Fire Support Coordination Measures

TYPE AND PURPOSE	ESTABLISHED BY	LOCATED	DISSEMINATION
COORDINATED FIRE LINE (CFL) A line beyond which conventional surface fire support means (mortars, field artillery, and naval gunfire) may fire any time within the zone of the establishing headquarters without additional coordination. *Purpose* -to expedite attack of targets beyond the CFL.	Brigade or division. May be established at battalion.	As close as the supported CO desires to "open up" an area to fires.	Through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units.
FIRE SUPPORT COORDINATION LINE (FSCL) A line beyond which all targets may be attacked by any weapon system (including aircraft and special weapons) without endangering troops or requiring additional coordination with the establishing headquarters. The effects of any weapon system may not fall short of this line. *Purpose* -To expedite the attack of targets beyond the fire support coordination line.	Corps or Division (independent).	Normally placed on terrain identifiable from the air.	Through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units, to include air fire control agencies.
FREE FIRE AREA (FFA) A specific, designated area into which any weapon system may fire without additional coordination with the establishing headquarters. *Purpose* -To expedite fires, and to facilitate the jettison of CAS munitions if the aircraft are unable to drop on the target.	The commander, usually division or higher, following coordination with host nation.	On identifiable terrain, when possible; by grid designation if necessary.	Through both maneuver and fire support channels to higher, lower, and adjacent maneuver and supporting units, and the host nation.

Source: Department of the Army, Fire Support in Combined Arms Operations, FM 6-20 (30 September 1977) p. H-15.

Fig. 4-2. Permissive Fire Support Coordination Measures

The restriction is that before engaging any identified target, the immediate area surrounding the target must be cleared of friendly aircraft by the element controlling the fire support. The method of designating the terrain must make it simple to convey the control measures to all of the fire support means. For the attack helicopters, aeroscouts, and aerial observers, a 1,000 meter grid square or larger would be satisfactory to designate the FFAs and RFAs. However, for CAS aircraft, the means must be terrain features or other designation means. The point is that fire support coordination can be accomplished best in the AFIST environment.

Airspace management on the modern battlefield is one of the most complex problems facing the Army today. Much of the complexity can be eliminated by analyzing the hazards to friendly aircraft, by better training, and by realizing that the best approach is to try to minimize the risks versus eliminating them. The impact area of the field artillery represents one hazard that needs to be resolved. All aircraft in the AO of the AFIST will be operating below the trajectory of the projectiles except when CAS aircraft "pop up" to engage targets. Units can be taught to clear

the immediate areas around the initial trajectory path; hence, this concern can be essentially eliminated with sound training. However, the impact area remains a concern because most aircraft will be below 100' AGL. The large volume of fires, coupled with the larger areas covered by improved munitions, could result in the loss of friendly aircraft. A similar situation exists when volleys of 2.75 inch rockets are fired from attack helicopters in the indirect fire mode, and by the CAS delivery of cluster bombs. Thus, aircraft must stay out of the high density impact areas. When airspace management is combined with fire support coordination, the problem is simplified. The free fire areas would also be the no-fly areas. Fire support assets who whish to engage targets in the restricted fire areas would be under the restriction to insure that their fires are reasonably safe.

CAS aircraft would operate above the coordinating altitude which is defined as an airspace management procedure normally used to separate rotary-wing from fixed-wing aircraft. A typical situation would have rotary-wing aircraft operating from surface to 50' AGL with CAS operating above 50' but generally below 150'. In the AFIST's AO, the only time CAS aircraft will exceed 150' will be when they are engaging targets. Major Theodore T. Sandak in his thesis

entitled, "Employment of Airborne Air Cavalry in the Airborne Antiarmor Defense" convincingly points out that the helicopter at treetop level can survive in a sophisticated air defense environment.[3] The major missile threat at division level is the SA-9 Gaskin which is a heat seeking, passive IR missile with a range of 7 kilometers and operates effectively down to 20 meters AGL.[4] This is employed in conjunction with the ZSU-23-4 which has a range of 2,500 to 3,000 meters depending on how it is controlled. The ZSU-23-4 is equipped with four 23mm cannons and is self-propelled. This is probably the most dangerous OPFOR AA weapon used against helicopters. The other missile used at division level is the heat seeking SA-7 Grail. It is a shoulder fired missile which is effective out to a range of 3.5 kilometers and down to an altitude of 50 meters AGL.[5] The CAS aircraft of the AFIST will receive their information concerning free fire areas and OPFOR air defenses from the aerial forward air controller and each flight leader will maintain internal separation for the aircraft in his flight. For example, a technique which would probably be used as pointed out by the Joint Air Weapon System Exercise is for egressing aircraft to maintain separation from ingressing aircraft that

are concentrating on target engagement.[6] Thus, a few of the coordinating measures that the AFISC must establish are coordinating altitude, free fire areas and restricted fire areas.

The last function of the AFISC would be to maintain control of the different fire support means during the operation of the AFISC in order to reduce the risks of accidental losses caused by one element shooting down another and the risks associated with engaging a well-equipped and trained OPFOR. The tactical missions associated with the field artillery and the attack helicopters as discussed in Chapter 3 will provide the necessary operational control authority needed by the AFIST. The allocation and control system of the Air Force as discussed in Chapter 2 will provide the responsiveness that the AFIST needs. The problem remains of how to control the different elements in a combat situation to optimize their effectiveness. Fortunately, this is not an impossible task and will be discussed in detail in the next section. The center is basically a coordination and control facility and will establish time sequences, provide early warning, and formulate and execute countermeasures, but it will not directly fight the battle. That is left up

to the different elements of the team.

The personnel requirements of the center would correspond with its functions. Below is a listing of the recommended staffing to accomplish each of the functions discussed plus overall supervision.

Position	Grade	Required
Intelligence officer	04	1
Fire support officer (artillery)	04	1
Attack helicopter liaison officer	04	1
Air liaison officer	04	1
Airspace management (performed by all three fire support coordinators)		
Assistant chief (optional)	04	1
Chief of center	05	1

The center is designed to operate from one utility helicopter. In addition to personnel operating the center, the aircraft would have its normal crew to include door gunners.

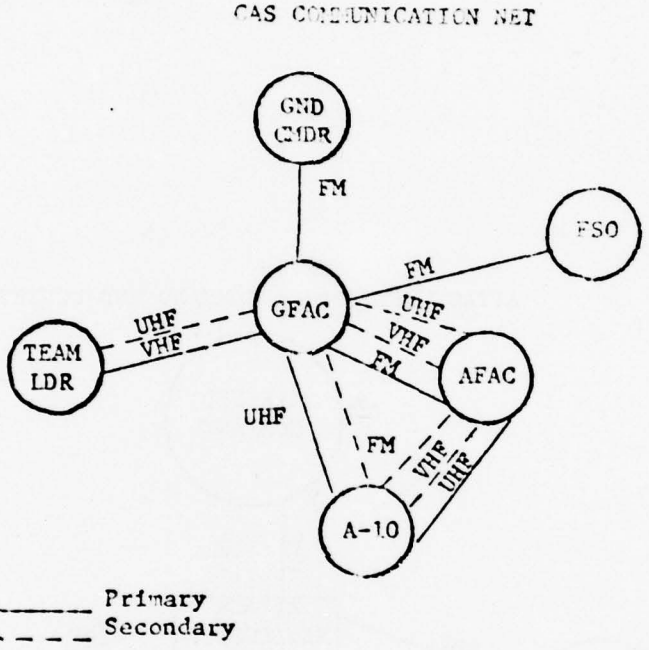
The first position listed is manned by an intelligence officer trained in OPFOR tactics and equipment. His sources of information could be all inclusive. The three fire support coordinators represent each of the three fire support elements of the team. Their communications are directed with one but

not more than two sources of their respective elements. For instance, the attack helicopter liaison officer communicates with the command ship of his respective element on their designated frequency. In this way, other aircraft can monitor the transmission between the center and their control ship. The artillery fire support officer communicates with a designated command ship representing the aerial observation aircraft with others monitoring as desired. The air-liaison officer communicates with the DASC and enroute aircraft. He directs the enroute flights to contact the aerial forward air controllers at specified contact points. As mentioned in Chapter 2, the aerial observers and aeroscouts are cross-trained to direct the CAS aircraft onto targets. The AFACs insure that the CAS pilots know exactly where the target and free fire areas are and in this way perform, as an extension of the center, a part of the airspace management function. The CAS aircraft would have to provide their own separation from each other. The chief of the center would be the over-all decision maker for the AFIST. His duty would be to use the information and advice of his staff to plan how the battle should be fought and to make subsequent decisions during the battle. He also communicates with higher

headquarters and with any maneuver forces involved. In maneuver forces were directly involved, the chief would have an assistant next to him to assist in coordinating with the maneuver forces.

The equipment required in the center can be categorized into two types; communication and other. The close air support communication net is illustrated in Figure 4-3. Likewise, Figures 4-4 and 4-5 illustrate the attack helicopter command and control net, and the field artillery's command and fire direction nets. From these existing systems and with some modification, the following communication requirements per position can be derived:

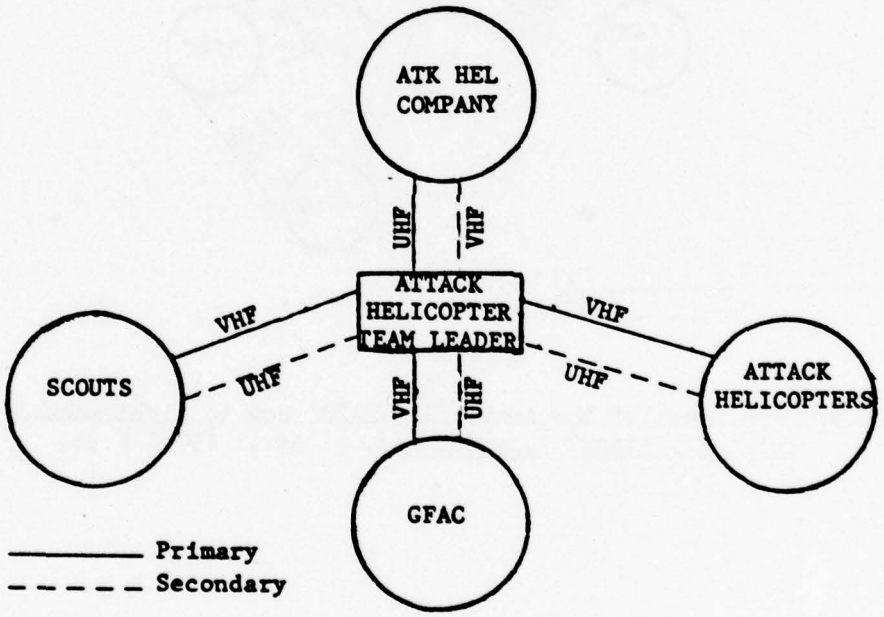
Position	Quantity S = Secure	Type	Purpose
Chief	1	HF	Communication with higher headquarters
Assistant (if required)	2 (S)	FM (1)	Communication with higher headquarters
		(1)	Communication with ground elements
Fire support officer (artillery)	2 (S)	FM	Communication with artillery control elements
Air liaison officer	1	UHF	For contact with DASC and AFAC
	1	VHF	
	1 (S)	FM	



Source: Department of the Army, TAC/TRADOC How to fight manual (DRAFT), Joint Air Attack Team Tactics, (1 April 1978) P.36.

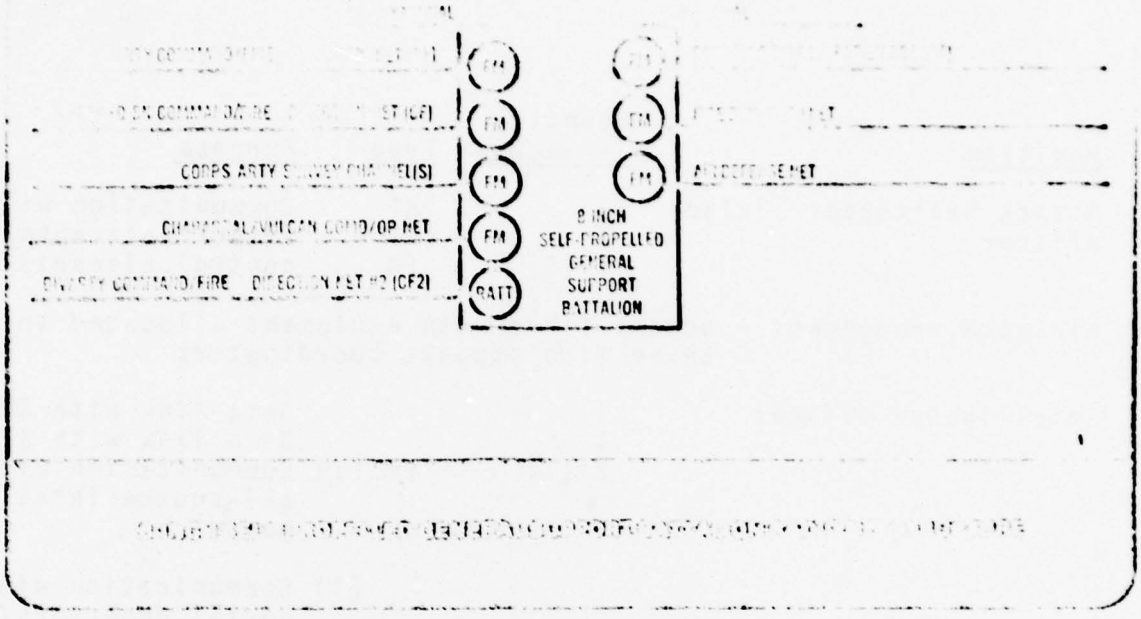
Fig. 4-3. CAS Communication Net

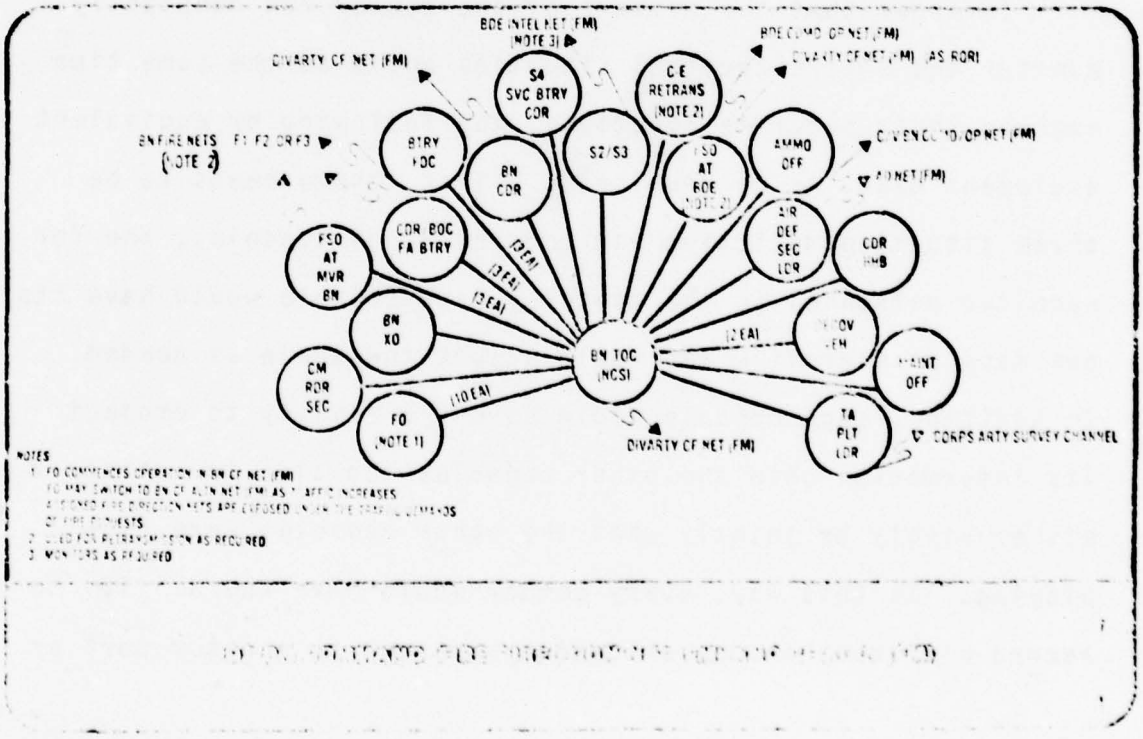
ATTACK HELICOPTER COMMAND AND CONTROL



Source: Department of the Army, TAC/TRADOC How to Fight Manual (DRAFT), Joint Air Attack Team Tactics, (1 April 1978)p.35.

Fig. 4-4. Attack Helicopter Command and Control Nets





Source: Department of the Army, Combat Communications within the Division, FM 11-50 (31 March 1977) p.5-13.

Fig. 4-5. DS BN Command/fire Direction Center Net

Position	Quantity S = Secure	Type	Purpose
Attack helicopter liaison officer	1 1 1 (S)	VHF UHF FM	Communication with attack helicopter control elements
Airspace management - accomplished with equipment allocated to three fire support coordinators			
Intelligence officer	1 1 2 (S)	 FM (1) (1)	Data link with SOTAS Data link with RPV Communication with all-source intelligence Communication with aerial observers/ aeroscout intelligence net

In order that the members of the center can constantly monitor the entire tactical situation while at the same time execute their separate functions, the following or equivalent equipment need to be developed. First, there needs to be three situation-depicting and communication consoles, one for each two personnel in the center. Each console would have its own maps on microfilm and could adjust the scale as needed. In addition, each console would have the ability to project its information onto the other consoles and also to monitor either singly or jointly what the other consoles were displaying. In this way, every member would have the ability to record his input on the situation maps and to monitor part or

all of the inputs from the other consoles. The technology exists and the display system would be cost effective. The center would need an intercommunication system in order that the members can talk among themselves or with the aircraft crew. The communication selector system could be the same as currently installed in US aircraft. Also, each member would use a "headset". The layout of the center would be as shown on Figure 4-6.

The UH-60A Blackhawk Transport Helicopter may be able to be modified to meet the aircraft requirements of the center. It is powered by the same General Electric T700 turboshaft engines used in the YAH-64 advanced attack helicopters.[7] The gross weight of 22,000 poinds allows it to carry a fully equipped 11-man infantry squad and three crew members under all weather conditions.[8] Its endurance time is 2.3 hours but this could be extended by not remaining constantly airborne.[9] The Army has already ordered 71 of these aircraft and have requested funds to purchase another 129 in 1979.[10]

The AFISC would also work well as a division or brigade tactical command post since it would incorporate those functions normally associated with a tactical command post.

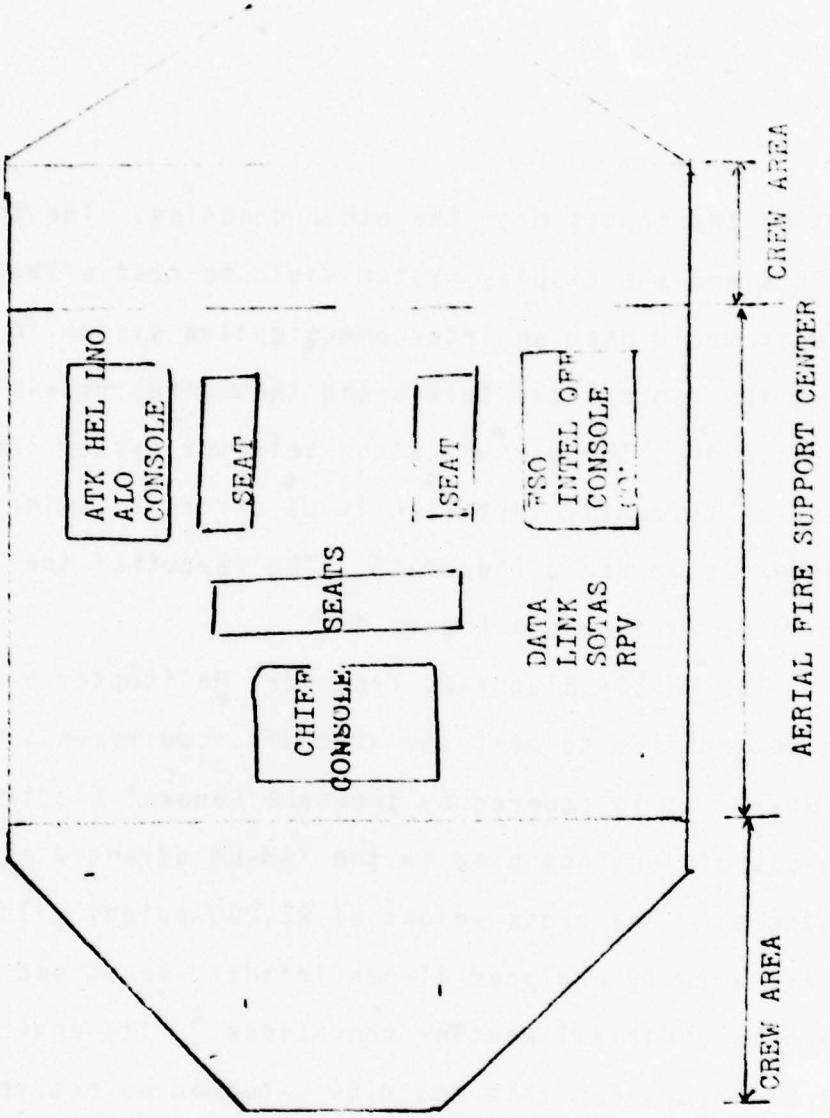


Fig. 4-6. Internal design of AFISC in One Helicopter

Another modification that would increase the versitility of the center would be to provide an external hook-up where the electric power could be supplied to the center by an external power unit when the aircraft is on the ground. Also, the antenna connections could be arranged in the same manner in order that when the aircraft landed, it could hook-up to a bank of antennas already emplaced and remoted.

The capabilities and versitility of an Aerial Fire Support Center as envisioned in this paper are impressive. However, according to the latest information available to the author, no such center is in the planning or development stage. The technology is available and the center could be available by 1985. More study is needed in this area and will be recommended in this thesis.

Chapter 4

Section II

Fire support coordination and airspace management in the AO of the AFIST are two functions that go hand-in-hand. Figures 4-1 and 4-2 list the fire support coordination measures now in common use. Airspace management control measures that are currently used or envisioned for use with the AFIST are illustrated in Figures 4-7 and 4-8. By giving some of these measures overlapping definitions and using others discretely, the two functions of fire support coordination and airspace management could in some situations be combined. For example, the FFA of the AFIST must also be a no-fly area. Figure 4-9 illustrates how the FFA and the RFA would be used in a typical situation. Another clarification but one which is easily made is the expanded use of the RFA in order that all weapon systems be used in it while helicopters and CAS cautiously operate in the area. But there still must be safeguards. Before artillery is fired into a RFA, two actions take place. First, all aircraft are warned of the 1,000 meter grid

[illegible] ALTITUDE. Airspace management procedure normally used to [illegible] be rotary-wing from fixed-winged aircraft and is given as height in [illegible] above ground level.

2. [illegible] RISK ROUTE. Temporary routes of flight recommended for Air force use presenting the minimum known hazards to low flying aircraft transiting the tactical operations area.

Depicted as:

MRR Unit Surface to 150

EFE on call (15 minute lead time)
Color Blue

3. STANDARD USE ROUTES. Routes established by Corps Airspace Management Element to serve as Army aircraft routes through the rear operations area to designated points in the tactical operations area.

Depicted as:

Color Black

4. AIRSPACE COORDINATION AREA(ACA).A block of airspace in the target area in which friendly aircraft are reasonably safe from friendly surface fires. It may occasionally be a formal measure (a three dimensioned "box in the sky"). More frequently, it will be informal such as "keep the artillery and naval gun fire north of green river and close air support south).

Depicted as:

Color Black

ACA
Unit
Altitude
Maximum Altitude
Effective time

5. AERIAL CHECK POINT.* A readily identifiable terrain feature that serves as a mandatory reporting point for aircraft. This measure serves as a contact point for all aircraft entering controlled battlefield airspace.

Depicted as:

Color Black

ACP 1

6. AERIAL REFERENCE POINT.* A readily identifiable terrain feature that serves as a control measure to maneuver aircraft, report significant events, or for any other purpose to facilitate airspace management in the main battle area and forward.

Depicted as:

Color Black

ARP 2

Fig. 4-7. Airspace Coordination Measures

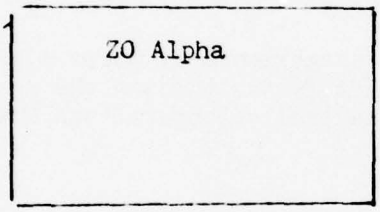
7. AIR CORRIDOR. A three dimensional block or [illegible] established along preferred routes to minimize the risks to army [illegible] from friendly forces.

Depicted as:
AC Unit Surface to 100'AGL

EFF on call (lead time 15 min)
Color Black

8. ZONE OF OPERATION*. Airspace allocated or suballocated to an aviation unit or aircraft in which that unit or aircraft is the airspace manager. This measure is used where aviation assets are engaging or anticipating engagement with an opposing force.

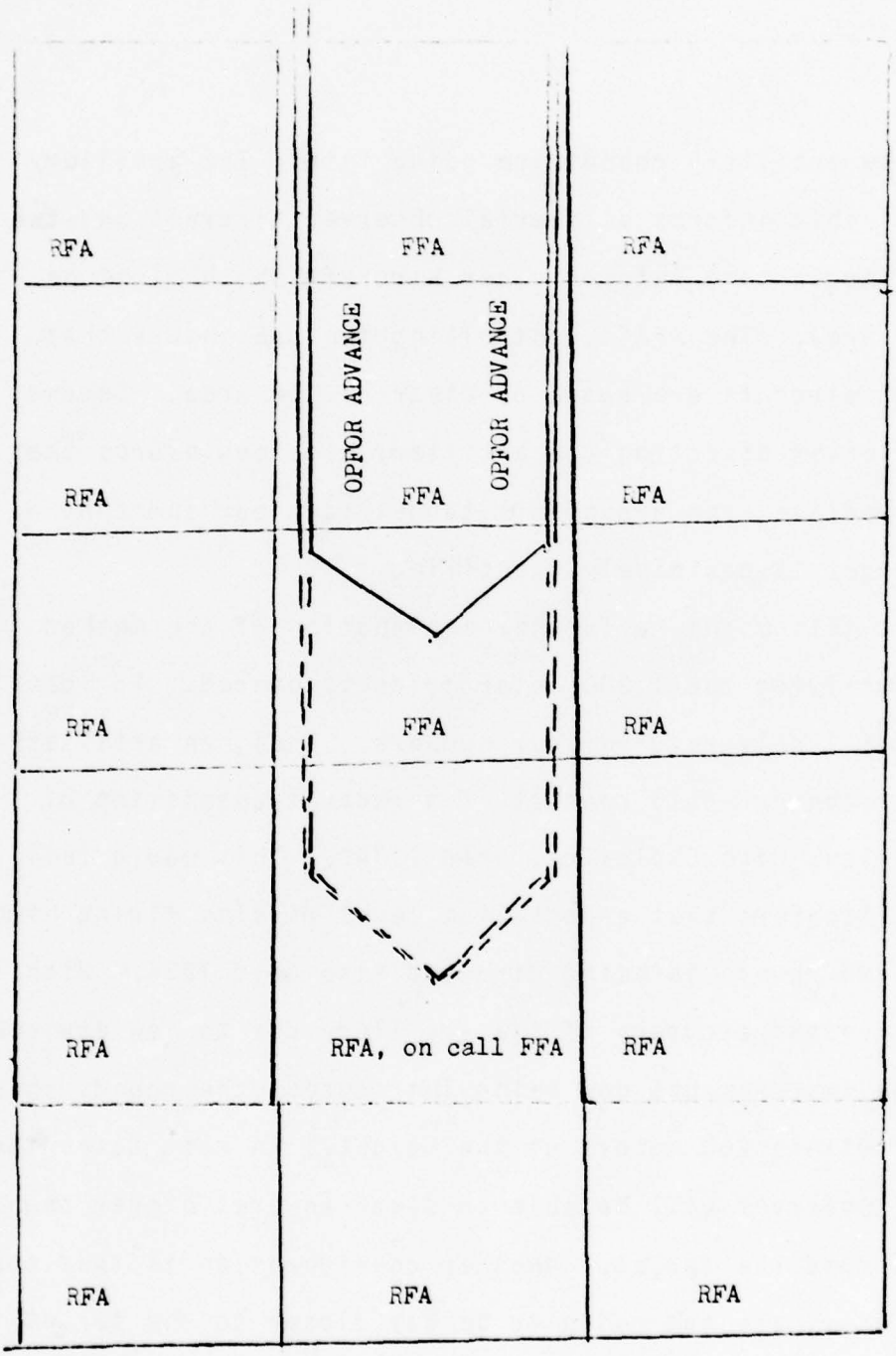
Depicted as:



Color Green

* Denotes measures that are not standard in the Army

Fig. 4-8. Airspace Coordination Measures



FFA = Free Fire Area

RFA = Restricted Fire Area

Fig. 4-9. Example of Fire Support Coordination Measures as applied to the AFIST

that the artillery rounds are going into. The artillery control ship informs all aerial observer aircraft and the AFISC who in turn informs other aircraft which might be in the area. The AFACs controlling the CAS insure that the CAS aircraft are aware or clear of the area. Second, the observer directing the artillery mission insures that the immediate area around his target is clear and that the target is positively identified.

At this point, a further explanation of the method of identifying the 1,000 meter grids is needed. To identify these will only require four numbers. Thus, an artillery strike warning would consist of a radio transmission of "Battalion, High Explosive, Grid 1234". This would tell all helicopters that a battalion level mission firing high explosive rounds is being directed into Grid 1234. With the increased accuracy of the artillery due to new equipment and the improvements now being introduced, the rounds should impact within 200 meters of the target. In most cases the aerial observer will be able to clear an area bigger than this around the target. Another consideration is that the helicopters are not going to be any closer to the target area than absolutely necessary. This will reduce the

chance of a US helicopter being shot down by friendly artillery fires.

With the addition of the coordinating altitude and with the stipulation that the CAS aircraft will provide their own separation, in most cases the risks associated with fire support coordination and airspace management are substancially reduced.

The allocation of airspace around the FFA is decided by the center in general terms such as east of the FFA or west of the FFA, or by prelabeled "zones-of-action". Once a general allocation of airspace is received, the attack helicopter control aircraft and the aerial observer control aircraft suballocates their airspace. In a case where both the aerial observers and attack helicopters are working in the same airspace, the aerial observers would be suballocated airspace by the control element of the attack helicopters. However, as with the attack helicopters, each aerial observer is given a sector of the FFA that he is to concentrate on when not engaging air defense weapons. This suballocation of airspace and target area must be flexible in order that each element can react to the changing situation. For example, six aerial observers on station at one time would

be given specific instructions such as these:

Aircraft #1	Seed the front of the column with FASCAM.
Aircraft #2	Use Copperhead to knockout tanks with mine breeching capability. Concentrate on grids 6212, 6213, 6312, 6313.
Aircraft #3, #4	Concentrate on grids .... Prevent tank force from moving east.

In this example, each aircraft has a definite area into which he will direct his fire support assets. However, these aircraft are not restricted to these areas and if the targets move out of the area, they can automatically adjust to the situation. The control ship for the observers is the one which actually assigns the target areas for each aircraft after he has received the overall plan from the center. In every situation, the different elements must be given the maximum feasible flexibility to accomplish their mission.

FM 17-50, Attack Helicopter Operations, explains how helicopter units fight. With this guidance and the refinements made by unit Standing Operating Procedures, the attack helicopter battalion can function under the center's guidelines. In fact, the center's purpose is to coordinate and

expand the capabilities and survivability of the attack helicopter battalion. Therefore, there is no unsolvable problem in integrating this weapon system into the AFIST.

The artillery and helicopter units must be given a tactical mission in support of the AFIST. In this way, the units are responsible to the center but retain their own command structure. Chapters 2 and 3 discussed the tactical missions normally associated with each type of fire support element. These missions work well with the AFIST concept, but in most cases, they would not be standard. For instance, an artillery brigade might be given the mission of DS to the AFIST but with the modification that ground fire support teams and FSOs are not required to be furnished, only aerial observers. Since the field artillery brigade does not have its own observation aircraft, an artillery support platoon from the rear division's general aviation company would be attached to it.

CAS request would go through immediate channels from the center directly to DASC. The request would be made by the ALO against the allocations to the AFIST. If more sorties were needed than allocated, the chief of the center would request more sorties from higher headquarters.

The joint air weapon systems study which resulted in the draft TAC/TRADOC how to fight manual entitled, Joint Air Attack Team Tactics, contains two charts. Figures 4-10 and 4-11 address (1) the options on passing friendly artillery information to A-10 CAS pilots and (2) the options for separation of A-10s and impacting field artillery rounds. Figure 4-10 points out clearly that A-10 pilots should not be given references that would require reference to a map. The reason for this is that the A-10 is a single pilot aircraft traveling at 50 to 100 feet above the ground at speeds exceeding 220 knots. These flight characteristics preclude the pilot from concentrating on a map. But the other four methods of clock on geographic feature, line on geographic feature, real-time observation, and white phosphorous round on each concentration are feasible. However, the white phosphorous and smoke rounds may need to be restricted somewhat when thermal sights are not available. The second chart, Figure 4-11, demonstrates that joint attack and reduced risks-joint attack are the best overall methods of engaging targets. A joint Air Force-Army study concerning the effect that artillery suppression of air defense weapons had on the ability of CAS to perform its mission showed that the

[illegible] PASSING FRIENDLY ARTILLERY INFORMATION TO A-10 CAS PILOTS

TECHNIQUE	DESCRIPTION	SIMPLICITY	COORDINATION EFFECTIVENESS	DESCRIPTIVE OF SITUATION	SECURITY	MANAGEABILITY	[illegible]
GRID COORDINATES	[illegible] coordinates of friendly artillery points of impact [illegible] to A-10's by radio	[illegible] A-10's [illegible] handling by pilots.	[illegible] for pilots to plot [illegible]	Exact description of situation from FSO viewpoint but gives more information to pilots than they need	Less secure. There is [illegible] capability [illegible] inbound A-10's from the ground	Unsatisfactory from A-10 pilot's viewpoint. Difficult [illegible]	None. [illegible] map reading [illegible]
GRID LINE	Friendly artillery points of impact are sent by radio in relation to a grid line [illegible] grid line"	Simpler from all viewpoints [illegible] map handling by pilots	Same as grid coordinates	Descriptive only if artillery concentrations are a significant distance from the A-10 targets	Less secure [illegible] a clear indication [illegible] fired	Better than grid coordinates but still requires pilots to handle a map	None. [illegible] standard map reading [illegible]
GRID SQUARE	Grid square containing friendly artillery points [illegible] by radio [illegible] grid square [illegible]"	Simpler than grid coordinates but still requires lengthy radio transmissions and map handling by pilots.	Same as grid coordinates.	Same as grid line.	Less secure when secure communications are not available	Unsatisfactory. Same as grid coordinates from A-10 pilots viewpoint.	[illegible] standard map reading [illegible]
CLOCK ON GEOGRAPHIC FEATURE	Friendly artillery points of impact described by radio in relation to a prominent terrain feature with grid north [illegible] as 12 o'clock. e.g. "Arty from blue lake [illegible] o'clock [illegible] meters."	Simple for FSO, FAC, and pilots who have trained properly.	Highly effective for FSO, FAC, and pilots who have trained properly.	Excellent. Easily adopted to pass other target info to A-10/AH pilots.	Better than all above but satisfactory only if terrain reference can be passed to pilots in a secure manner.	Good as long as system is understood ahead of time.	Air and [illegible] units must train using procedure[illegible]
LINE ON GEOGRAPHIC FEATURE	Friendly artillery points of impact described by radio in relation to a line on a prominent terrain feature. e.g. "[illegible] miles west of Red River."	Good.	Effective only if terrain feature is prominent from 100-foot altitude and separates A-10 targets from artillery concentrations.	Good if terrain feature separates artillery concentrations from A-10 targets.	Unsatisfactory would be a clear indication where artillery is not being employed.	Good.	[illegible]
REAL TIME OBSERVATION	FAC [illegible] A-10 pilots friendly artillery is impacting [illegible] target [illegible] Pilots visually determine the active impact points and avoid	Good.	Effective but A-10 pilots cannot plan attack until they are in immediate area. Best option when comms between FAC and FSO are limited.	Good but may be difficult to separate from enemy artillery.	Good.	Good.	Limited [illegible] should [illegible] to observe [illegible] during training.
[illegible]	Same as real time observation with [illegible] rounds fired [illegible] to each concentration	Good.	Same as above	Better than above but [illegible] the same [illegible]	Good	Good.	Limited [illegible] firing [illegible] be coordinated [illegible] with [illegible]

Source: Department of the Army, TAC/TRADOC How to Fight Manual (DRAFT), <u>Joint Air Attack Team Tactics</u>, (1 April 1978) p.33.

Fig. 4-10. Options For Passing Friendly Artillery Information to A-10 CAS Pilots

...TIONS FOR SEPARATION OF A-10s AND IMPACTING FIELD ARTILLERY ROUNDS

	DESCRIPTION	MAXIMUM FIREPOWER	CONTINUOUS PRESSURE	ADA SUPPRESSION	FREEDOM OF A-10 TACTICS	ADVERSE IMPACT ON ATTACK HEL OPERATIONS	COORDINATION SIMPLICITY	DISTRIBUTION OF AMMUNITION ON PRIORITY TARGETS	DISTRIBUTION OF ATTACKS ON PRIORITY TARGETS	TRAINING IMPACT
JOINT ATTACK	A-10's, AH, and artillery attack same targets simultaneously. A-10's use roll like penetration to see and avoid army target areas.	Best for a limited number of targets attacked over a short period of time.	Facilitates for a time concentrated attack. Could be poor if AH, A-10's and artillery all run short of ammo before the target area is defeated.	Facilitates.	Most impact. A-10's must be adjusted to artillery concentrations along or that danger areas can be avoided.	None.	Simple. Can be carried out with limited communications between FAC, FSO, and A-10's.	Poor if large target area is to be attacked for a long period of time.	Poor if large target area is to be attacked for a long period of time.	Low impact. All pilots must be able to execute artillery fires during training.
SEPARATION BY SECTOR	Target area divided into sectors for attack by either army and AH or A-10 and AH. Artillery fire sectors as outlined by FSO-ALO.	Marginal for a limited target area in a time constrained attack. Each separate part requires either the to get defeat capability of artillery or A-10's.	Good	Unsatisfactory for sector not attacked by artillery.	Satisfactory as long as no-fly areas are well coordinated.	Significant for sectors without artillery fire.	Advance coordination between A-10's and artillery units required.	Poor. Ammunition distributed by area instead of target priority and optimum attack routes.	Poor. Ammunition distributed by area instead of target priority and optimum attack routes.	Low impact.
SEPARATION BY TIME	Use targets attacked by A-10's without army for 1 to 5 min period and then attacked by artillery for 3 to 5 min period, etc.	Good since fire power distributed over time versus target area. Could reduce amount of fire power delivered in a time concentrated attack.	Good.	Satisfactory if artillery is shifted away from ADA targets only for short periods. Close coordination is mandatory.	Satisfactory if coordination between FSO, ALO, and pilots is good.	Limited if time windows are given and well coordinated with attack team leader.	Complicated. Requires close association between artillery units, FAC, and A-10 units.	Good if a large target area is to be attacked for a long period of time.	Good if a large target area is to be attacked for a long period of time.	Significant. [illegible]
STACKED RISK JOINT ATTACK	Artillery attacks to vicinity of A-10 targets conducted with ICM and no marking round. Priority for artillery is SAMs following tanks in order to avoid AH fire on possible A-10 targets.	Good	Good.	Excellent if target information is good enough to keep SA-7s in vicinity of tanks under attack.	Satisfactory if coordination between FSO, ALO, and pilots is good.	None.	Simple from A-10 pilot viewpoint. Requires advance coordination with artillery units.	Good if a small target area is to be attacked for a short period of time.	Good if a small target area is to be attacked for a short period of time.	Significant. [illegible]
[illegible]	[illegible]	Unsatisfactory. Indirect fires cannot be employed on targets not serviced by AH and A-10's.	Unsatisfactory. Sections of the target area not attacked by AH or A-10 would be free to operate without interference from indirect fire.	Unsatisfactory. Suppression of ADA would be largely dependent on direct fire weapons. Sections of the ADA target area could escape attack.	Least impact if unsuppressed ADA is not a factor.	Highly significant. ADA systems not adequately suppressed. Immediate indirect fire attacks on targets detected by AH not possible.	Difficulty, if not impossible to check fire mortar and artillery mission being fired close to friendly troops.	Unsatisfactory. Subordinate a single attack system without regard to target priority or command effects of close support systems.	Unsatisfactory. Subordinate a single attack system without regard to target priority or command effects of close support systems.	None.

Source: Department of the Atmy, TAC/TRADOC How to Fight Manual (DRAFT). Joint Air Attack Team Tactics, (1 April 1978) p. 34.

Fig. 4-11. Options For Separation of A-10s and Impacting Field Artillery Rounds

survivability of CAS aircraft was greatly increased.

It is appropriate at this time to discuss how each weapon system is employed in order that the senario introduced in Chapter 5 is understandable. The time frame of the weapon systems is 1985. First, all the artillery will be fired indirectly at the target. FASCAM will provide both the artillery and the CAS the ability to lay minefields wherever desired within range on the battlefield. The DP-ICM rounds will give the artillery the ability to easily destroy lightly armored vehicles, particularly major air defense weapon systems. The terminally guided projectiles will give the artillery the capability to destroy moving tanks in the indirect fire mode. The artillery units will probably be reorganized into eight-gun batteries in order to increase fire power. This would also facilitate a split-battery configuration. And lastly, because of many upcoming improvements, the artillery will be both more accurate and more responsive. The end result is that a great deal of the OPFOR armored threat, particularly his air defense systems can be neutralized by field artillery before direct fire weapons are employed.

Two other weapons that can be employed in the indirect

fire mode are the "Hellfire" missile and the improved 2.75 inch rocket. The range of the "Hellfire" is substantially greater than the TOW. The standoff range of the longest range 2.75 inch rocket is 6,000 meters.[11] The effectiveness and accuracy of these rounds have been improved to the point that they would be effective against an armored array of targets.

Both the terminally guided "Hellfire" and "Copperhead" are able to key onto laser-guided signals as mentioned in Chapter 3. Thus, by the use of multiple designation codes and designators, a wide variety of engagement techniques are possible. For instance, these rounds could be fired in rapid succession at different designated targets. For practical purposes, the primary limiting factors of multiple launches are the targets available for designation, the number of designators, and communications. With these weapon systems, the center would have the ability to destroy armored forces either by direct or indirect fires at much greater ranges than ever before. These systems also give the center or the commander more flexibility in the tactics that can be used against a massed armored attack.

ENDNOTES

1. Lieutenant Colonel Retsae H. Miller, "Air Superiority at the Treetops" Military Review (March 1979), p. 2-9.

2. Lieutenant Colonel Arthur D. McQueen, "The Ever-Expanding Umbrella," Air Defense (July-September 1976) p. 16.

3. Major Theodore T. Sadak "Employment of Airborne Air Cavalry in the Airborne Antiarmor Defense" (unpublished Master's thesis, Army Command and General Staff College, 1979) p. 22-35.

4. Department of the Army, Air Cavalry Combat Brigade, FM 17-47, p. 2-12.

5. Department of the Army, Air Defense Artillery Employment, Chaparral/Vulcan, p. 2-7.

6. Department of the Army, Draft TAC/TRADOC How to Fight Manual, Joint Air Attack Team Tactics (1 April 1978) p. 22-23.

7. Eric C. Ludvigsen, "1978 Weapons Directory," Army (October 1978) p. 174.

8. Ibid.

9. Ibid.

10. Ibid.

11. "Improved 2.75 inch Rocket System," (Prepared by the Office of the Project Manager, Huntsville, Alabama) p. 42.

COMMUNICATIONS

Chapter 5

Section I

Communication is important today because the US Forces must fight and win the first battle while being outnumbered. To counter the OPFOR numerical advantage in men and equipment, the US Force must be able to reposition its forces in order that the OPFOR does not gain a decisive advantage in combat power that would enable him to breech US defenses. One of the primary means of preventing this is efficient communications that give the commanders the information that they need and the time to counter the OPFOR's buildups by repositioning units.

The OPFOR also knows that the US Forces rely heavily on radio communications and to defeat the US Forces, he must attack the communication systems. To do this, he has developed highly sophisticated electronic warfare on a massive scale. His greatest efforts will take place at critical times such as at the beginning of an attack.

Because the AFIST relys almost exclusively on radio or

other electromagnetic communication links, it must be able to overcome the OPFOR's electronic warfare effort. Further complicating the communication problem is the fact that the AFIST aircraft will be flying at low altitudes or sitting on the ground. This makes line-of-sight radio communications improbable. Although research is ongoing in this area, no forseeable improved system is projected by 1985. In essence, the AFIST must be able to operate in the electronic warfare environment with basically the same equipment that it now has. The new equipment coming into the inventory is better but of the same type. Thus, the communications problem will still exist.

The OPFOR's electronic warfare efforts can be divided into four categories which are (1) to locate US Forces by means of direction-finding, (2) to monitor US radio nets to gather intelligence, (3) to transmit deceptive information, and (4) to jam US communication nets. We will look at each category to examine these OPFOR efforts.

First, because the aerial assets of the AFIST are highly mobile and will frequently be changing positions, the direction-finding efforts of the OPFOR will not be effective. However, he will be able to determine the

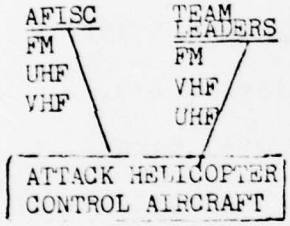
general area of operation of the AFIST, but this will become obvious anyway after the first minutes of the battle. The artillery units supporting the AFIST are more vulnerable to being accurately located. With the use of good tactics, such as split-battery operations, changing positions frequently, and selecting positions in defilade, the artillery units should be able to survive. Another factor assisting the artillery is that while the OPFOR is conducting his rapid advance, his ability to direction-find and to conduct counterbattery operations will be degraded. In essence, the direction-finding effort of the OPFOR will not be effective against the AFIST.

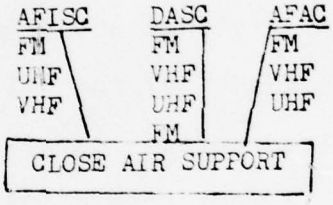
The next two categories of monitoring US radio nets to gather information and transmitting deceptive information can be overcome by good radio discipline and by using secure radio means when possible. Deception and communication violations have been a problem since the introduction of radios on the battlefield and can only be resolved by good training and reliable secure sets.

The last area of concern is the most dangerous to the AFIST. The OPFOR will attempt to jam selected US radio nets

and other electromagnetic data links. Simply stated, the principle of jamming a radio net works in the same manner as any transmitter. Its intent is to either overpower or to disrupt the transmissions of selected stations. The AFIST's principle radios are the FM, VHF, and UHF and require reasonable electronic line-of-sight between stations in order to communicate. The same is true for jamming equipment. Because of these characteristice, the aircraft of the AFIST will be located close enough together to overpower more distance and often screened jamming transmitters. The design of the AFIST communication system, Figure 5-1, incorporates two principles that will make aircraft-to-aircraft communications reliable. First, within the communication net, the control aircraft can serve as a relay station. This will shorten the distance between stations. Second, each element of the AFIST has, at least, three types of radios that can communicate with other aircraft. However, a problem does exist in establishing and maintaining communications between the aerial observers and the fire direction center, and between the center and rear headquarters. A similar problem exists in the case of the Forward Observer and the Fire Direction Center and

Other aerial observer aircraft have the same capability but will mainly communicate with the artillery, Intel Off, and Aerial Observer Control Aircraft.





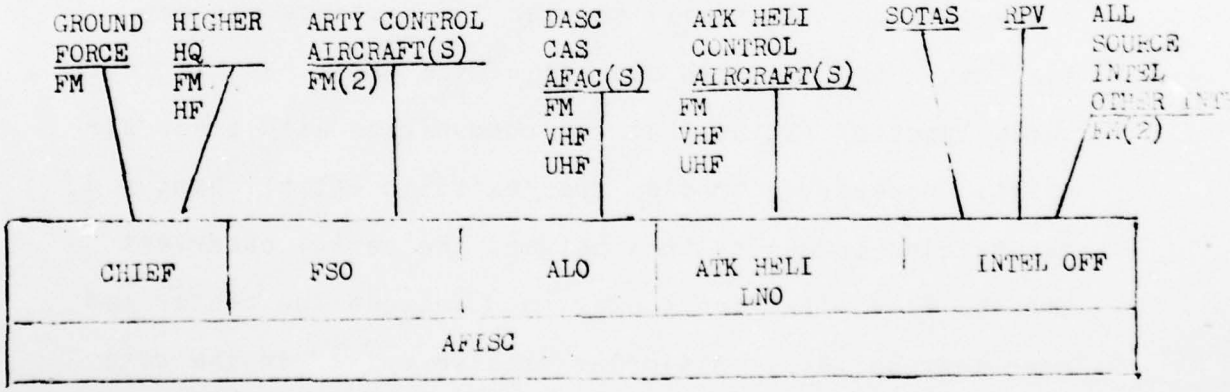


Fig. 5-1 AFISC Communications Nets

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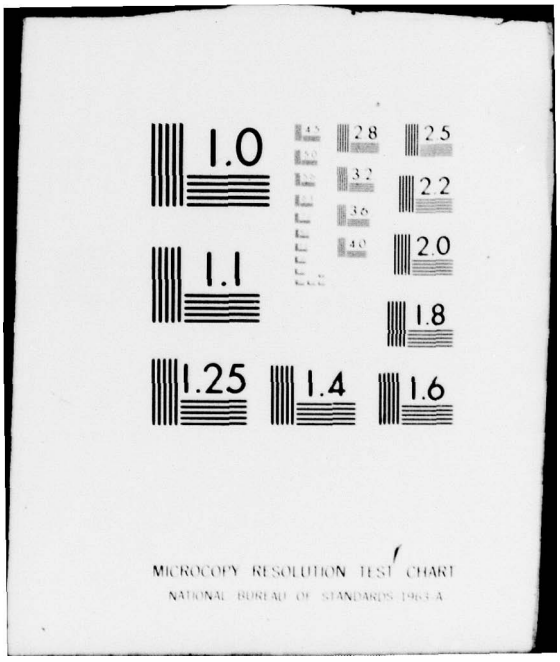
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MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963-A

between the main command post and the tactical command post of ground maneuver units. The AFIST aircraft can solve the problem by changing positions or by having aerial retransmission stations located between the AFIST aircraft and rear elements.

Thus far, only passive measures have been discussed to overcome the OPFOR electronic warfare effort. It must be remembered that the US will at the same time be conducting its own operations against the OPFOR's electronic capability. Thus, as the battle continues, the OPFOR will be losing more and more ability to conduct effective electronic warfare.

In conclusion, there is going to be a communication problem on the modern battlefield but it can be overcome. The mobility of the AFIST coupled with its multiple radio configuration and close proximity of aircraft will enable it to overcome, in most cases, the OPFOR's efforts. Like other aspects of the battlefield, whatever actions are necessary to be taken to accomplish the mission must be taken. In the case of the AFIST, it has a great deal of inherent ability to overcome whatever radio communication problems might arise.

Chapter 5

Section II

Section II of this chapter is intended to demonstrate how the AFIST can operate with the tactical mission of defending forward of the covering force. In the senario, the OPFOR is conducting a meeting engagement with a tank division in the AO of the AFIST. The purpose of the senario is to clarify and demonstrate how the AFIST can be employed using the principles and equipment discussed in Chapters 2, 3 and 4.*

THE OPPOSING FORCE IN THE OFFENSE.

The equipment and formation of the OPFOR are depicted in Figures 5-2 and 5-3.

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*Exchange ratios between the US and OPFOR weapons and the resulting total losses have not been calculated because this would require both a computer simulation of the battle as well as a study to approximate the increased combat points that should be added to each new or improved weapon system. The total effectiveness would be based on both the effectiveness of the weapon by itself and the multiplier effect of integrating all three fire support elements simultaneously. However, the intent of this paper is not to validate the concept but to present it in such a way that it can be studied, expanded and evaluated by computer simulation.

EQUIPMENT	MR	TK	MR	TK	MR	TK
ARMORED VEHICLES						
MEDIUM TK	255	325	40	95	–	40 31**
LT TK (AMP	19	19	3	3	–	–
APC (ICV)*	311	133	100	11	31	–
ARMORED VEHICLE (BRDM)	71	65	3	9	–	3
ARTILLERY						
122 HOW TOWED SP	54	60	6**	–	–	–
152 HOW TOWED SP**	18	–	–	–	–	–
MULTIPLE ROCKET LAUNCHER	18	18	–	–	–	–
FROG 7	4	4	–	–	–	–
120mm MORTAR	54	18	18	–	6	–
AIR DEFENSE						
57mm GUN S-60**	24	24	–	–	–	–
ZSU 23-4	16	16	4	4	–	–
SA 9	16	16	4	4	–	–
SA 7	112	36	36	–	9	–
ANTITANK						
100mm GUN T-12	18	–	–	–	–	–
73mm RECOILLESS SPG 9	18	6	6	–	2**	
ATGM (MANPACK)	18	6	6	–	2**	
ATGM (BRDM)	27	9	9	–	–	
AT GRENADE LAUNCHER	260	93	81	–	27	–
ENGINEER						
TANK LAUNCHED BRIDGE (MTU)	10	14	1	3	–	–
FOLDING BRIDGE (MMB)	20	14	1	3	–	–
FERRY (GSP)	12	12	–	–	–	2
PONTOON (PMP)	18	18	–	–	–	–

TOTALS FOR AIRBORNE DIVISION

122mm HOWITZER	18	SP ASSAULT GUN ASU-57/85	30
120mm MORTAR	18	85mm GUN SD-44	18
MULTIPLE ROCKET LAUNCHER	18	ATGM (MANPACK)	27

NOTES

* The independent tank battalion and the tank battalion of the MR division have 40 tanks, with 13 per company. The tank battalion of the tank regiment has 31 tanks, with 10 per company. The tanks may be T-54, T-55, T-62, or T-72.
* In their modernization process, the Soviets are progressing from the BTR series of armored personnel carriers, the latest of which remain in use, to the BMP infantry fighting vehicle. Within a division, there may be a mix of BTR-equipped regiments and BMP-equipped regiment(s). In this manual, where either situation might pertain the general term "APC" is used.
* Some regiments have an artillery battalion of 18 weapons.
* The artillery regiment of the tank division has 122mm howitzers only, but a change to one battalion of 152mm may be underway.
** In some air defense regiments of the MR and tank divisions, the 57mm S-60 guns are replaced with either the SA-6 or SA-8 surface-to-surface missile.
** BMP-equipped MR battalions may not contain an antitank platoon.

Source: Department of the Army, IAG-13-78, Soviet Army Operations, (April 1978) p.2-10.

Fig. 5-2 Soviet Vehicles in Tank Division

Source: Department of the Army, IAG-13-78, Soviet Army Operations, (April 1978) p.3-24.

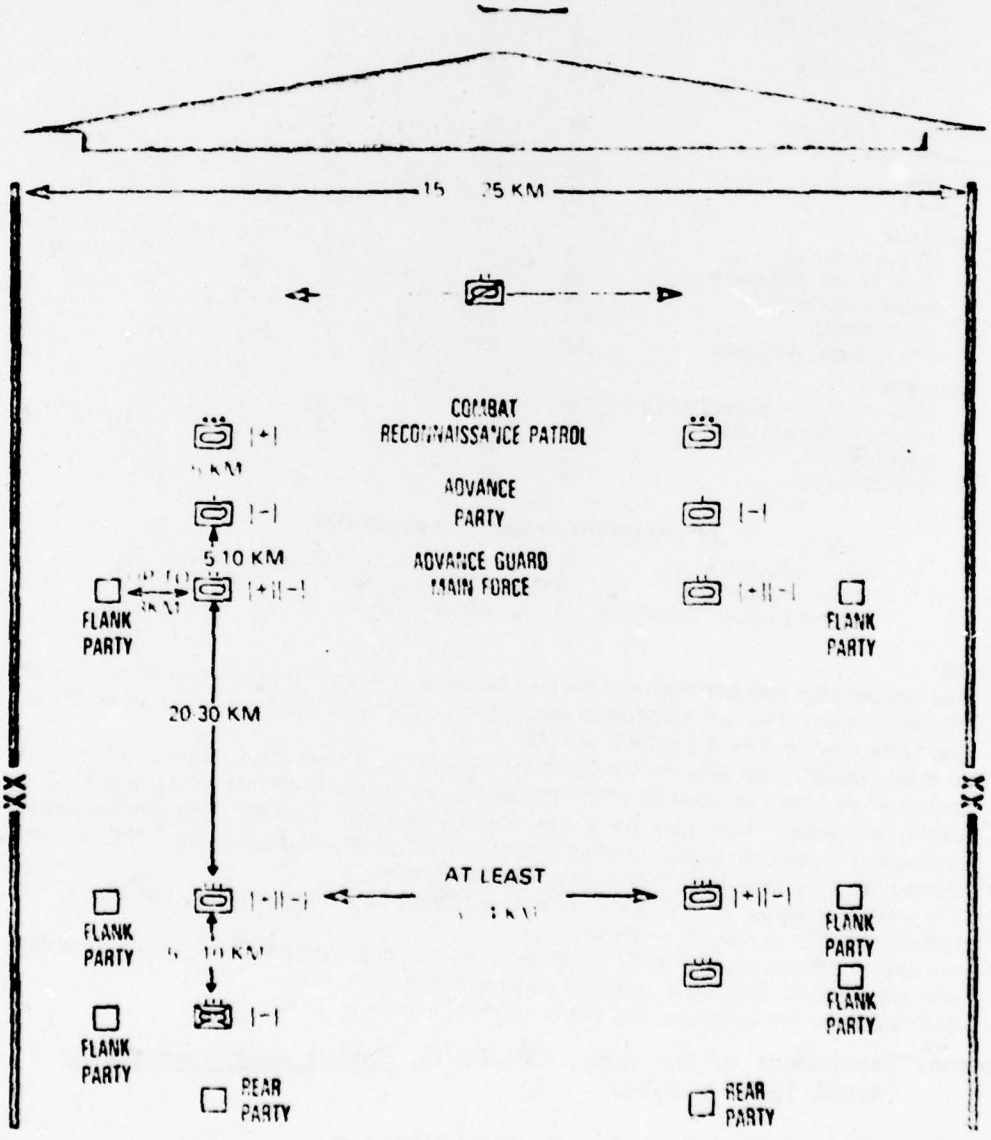


Fig. 5- 3 Typical Soviet Tank Formation

US FORCES.

US Forces consist of the following:

1. (1) AFISC
2. (1) Field Artillery Brigade with:
   - (4) 155mm self-propelled Howitzer Battalions
   - (1) Mechanized Infantry Battalion
   - (1) Medium Truck Transport Company
   - (10) Aerial Observers
3. (1) Attack Helicopter Battalion
4. (1) Aviation Platoon of 10 OH-58 aircraft with supporting equipment.

MISSION.

To defeat the OPFOR's first echelon consisting of one tank division, thereby forcing him to commit his second echelon.

COMBAT RATIO (without multipliers).

	OPFOR	US FORCES	RATIO (OPFOR VS US)
Maneuver Battalions*	13	2	6.5:1
Fire Support (Artillery)	4	4	1:1
(CAS)*	1	2	1:2

*For purposes of determining the combat ratios, the attack helicopter battalion was classified a maneuver unit. Also, the CAS ratio is in favor of the US because the OPFOR will depend on his local air defense system to defeat US CAS and will concentrate his CAS aircraft further to the US rear. For this senario, the US also has local air superiority.

SENARIO.

The OPFOR attacked at 0300 hours across the entire front of central Europe. The US Forces had the advantage of being familiar with the terrain but the attack was a tactical surprise because it was not expected until the OPFOR had massed more troops on his side of the border. As a precautionary measure, the US had placed a covering force in positions just beyond the OPFOR's 152mm artillery. In addition, the division commander had emplaced the AFIST and had given it the structure and mission described.

Each likely avenue of approach had been analyzed by the division commander and his staff. The AFISC members had been briefed on the commander's plan and had prepared a detailed analysis to include combat service support requirements, proposed primary positions of all elements, fire coordination and airspace management measures, coordination with the covering force, primary and alternate radio frequencies and zones of operations of each element.

The OPFOR had recognized the effectiveness of the US helicopters against armored targets and placed his anti-aircraft weapons in his lead and flank elements. His

intelligence had indicated that he would not meet strong resistance initially. For this reason, he did not use the expected preparation before moving across the border.

The AFIST's attack helicopter and aerial scout elements were moved into forward positions. Within minutes the AFISC was in a forward position and was receiving data from the SOTAS. The attack helicopter element and the aerial observers were not divided by zones of action because the center decided that because of terrain, the attack helicopters could operate on both sides of the avenue that the OPFOR had selected. True to his doctrine, the OPFOR moved rapidly forward once across the border. His combat reconnaissance patrol, advance party and advance guard main force was twenty kilometers into US territory when they were engaged and stopped by artillery and attack helicopter fires. Because the OPFOR had reinforced the advance guard with additional antiaircraft weapons, the helicopters had fired their "Hellfire" missiles and 2.75 inch rockets in the

indirect fire mode. The artillery successfully used DP-ICM on the reconnaissance patrols, mined in front and in certain selected areas on the flanks with FASCAM. At the same time, tanks were disabled or destroyed with terminally guided projectiles. The main body of the OPFOR continued to close the gap between itself and the lead elements. It had not expected its advance guard to be stopped as quickly as it was but now planned to pass through the advance guard with its follow-on forces. Figure 5-4 depicts the situation at this point.

The AFISC had monitored the initial engagement and had decided that there was no need to modify its plan at this time. The SOTAS data link had indicated that the main force was closing rapidly on the remaining elements of advance guard. The center had instructed its elements not to engage the main body until its forward element began to pass through the advance guard.

When all was ready, three US artillery battalions fired battalion-sized missions with DP-ICM. Each battalion "walked" its fires as directed by the aerial observers. The other field artillery battalion seeded the lead elements with FASCAM and covered the minefield area with its own fires.

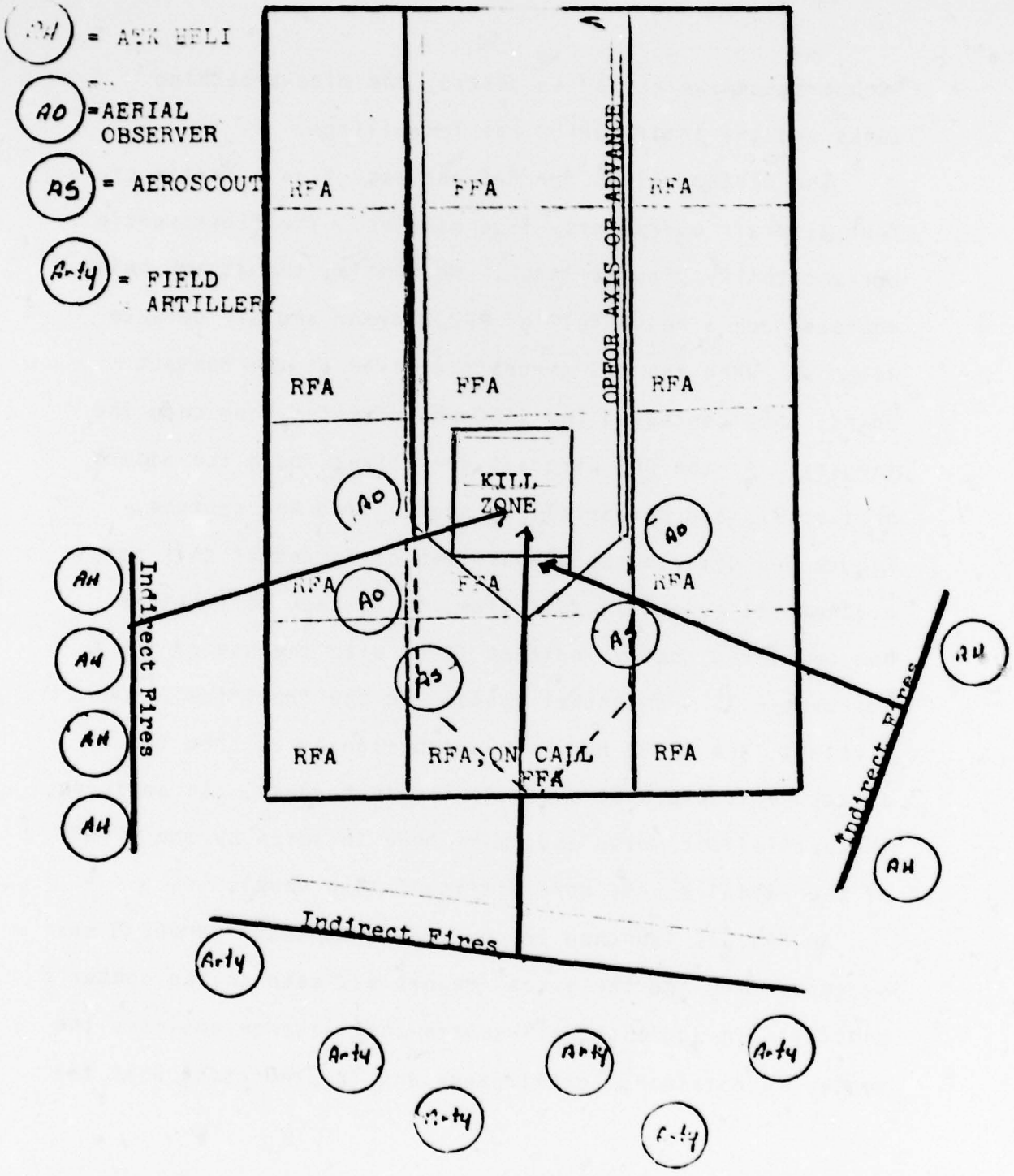


Fig. 5-4. Initial Engagement Of OPFOR by AFIST

"Copperheads" were used to destroy the mine-breeching tanks and the entire OPFOR was immobilized.

The center called for CAS and was given a sortie of four aircraft every forty-five minutes. The first sortie arrived thirty minutes later. Meanwhile, the attack helicopters took a heavy toll of OPFOR armor and air defense weapons. When the CAS aircraft arrived at the contact point, they contacted the AFAC who directed them onto the targets. As the CAS aircraft drew fires, both the attack helicopters and the artillery neutralized the sources. Figure 5-5 depicts the disposition of forces at this point of the battle. Until this time, the attack helicopters had delivered mostly indirect fires with the use of the improved 2.75 inch rocket system and the "Hellfire". As a result, the OPFOR had few launch signatures from the attack helicopters by which to locate targets. In addition, the battlefield noise and smoke made location by the OPFOR of the aerial scouts more difficult than usual.

An RPV was launched to cover an area that the SOTAS was screened from and the visual report was seen on the center's monitor. In addition, all-source-intelligence assisted the center in obtaining intelligence and in predicting what the

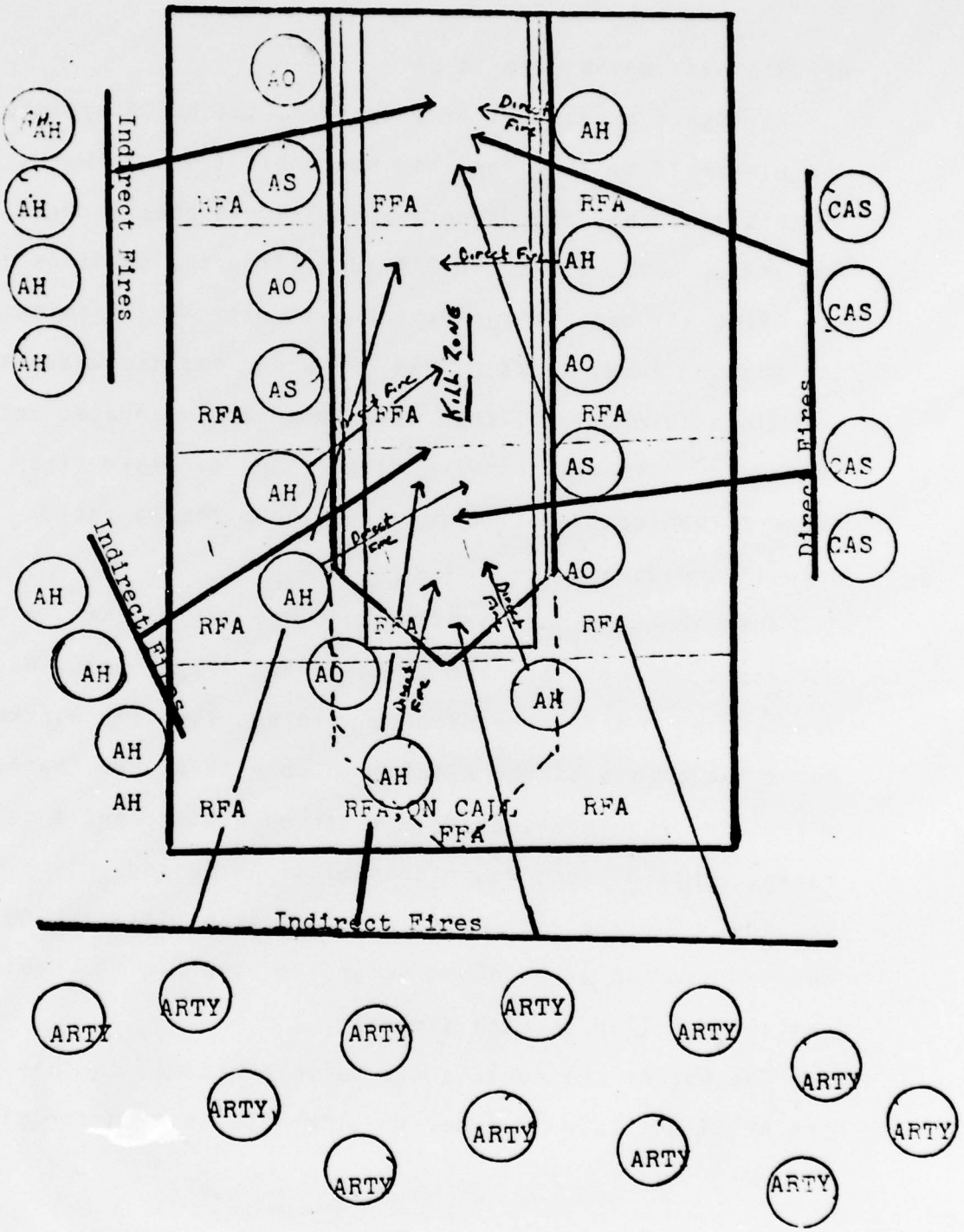


Fig. 5-5. Subsequent Engagement of OPFOR Main Body by AFIST

OPFOR's next moves were to be.

Through a great deal of sacrifice, the OPFOR breeched the minefield to the front and moved his tanks forward. By this time, his air defense umbrella had been reduced. The attack helicopters and CAS identified the openings in the OPFOR air defense system and systematically eliminated the exposed enemy tanks. When OPFOR air defense weapons were located or fired, they were immediately engaged until destroyed. The multiplier effect of the combined fire support team continued to increase the exchange ratio between the US and OPFOR.

When the main body arrived into the "kill zone", a partly successful effort was made by the OPFOR to jam certain radio frequencies. A few frequencies were successfully blocked but the elements of the AFIST were able to either change to alternate frequencies or to operate on a different type of radio. In addition, radio transmissions lasted only a few seconds. The artillery fire missions transmission time was only a fraction of a second because of the Digital Message Device installed on each aircraft.

The weaker the enemy's air defense became, the harder the AFIST attacked in order to eliminate as many targets as

possible before the next OPFOR echelon arrived. As the next division closed with the lead division, the decision was made to withdraw the AFIST. The Field Artillery Brigade and Mechanized Infantry Battalion were attached to the covering force. The aerial observers and the Medium Truck Transportation Company were left attached to the FA Brigade until the covering force was withdrawn.

THE OPFOR IN THE DEFENSE.

If a smaller force is to win against a large force, it must eventually take the offensive. It may be necessary to first weaken the OPFOR by defensive operations, but decisive results require that the smaller force go over to the attack, penetrate or outflank the OPFOR, and destroy his support, his command and control, and, eventually, his combat service support elements. According to FM 100-5, Operations, there are four prerequisites to win a battle. They are:

1. Adequate forces and weapons must be concentrated at the critical times and places. The combination is combat power.
2. The battle must be controlled and directed so the maximum effect of fire and maneuver is concentrated

at decisive locations.

3. The battle must be fought using cover, concealment, suppression, and combined arms teamwork to maximize the effectiveness of our weapons and to minimize the effectiveness of enemy weapons.

4. The teams and crews must be trained to use the maximum capabilities of their weapons.[1]

The manual also lists the fundamentals of the offense as six basic concepts which are:

1. See the battlefield.

2. Concentrate overwhelming combat power.

3. Suppress enemy defensive fires.

4. Shock, overwhelm and destroy the enemy.

5. Attack deep into the enemy rear to destroy his systems of defense.

6. Provide continuous mobile support.[2]

The AFIST concept supports all these prerequisites and fundamentals, but the best way to understand how the AFIST could support an offensive operation is to examine an offensive senario in which the AFIST is employed.

OPFOR SITUATION.

The OPFOR has temporarily stopped his advance and has

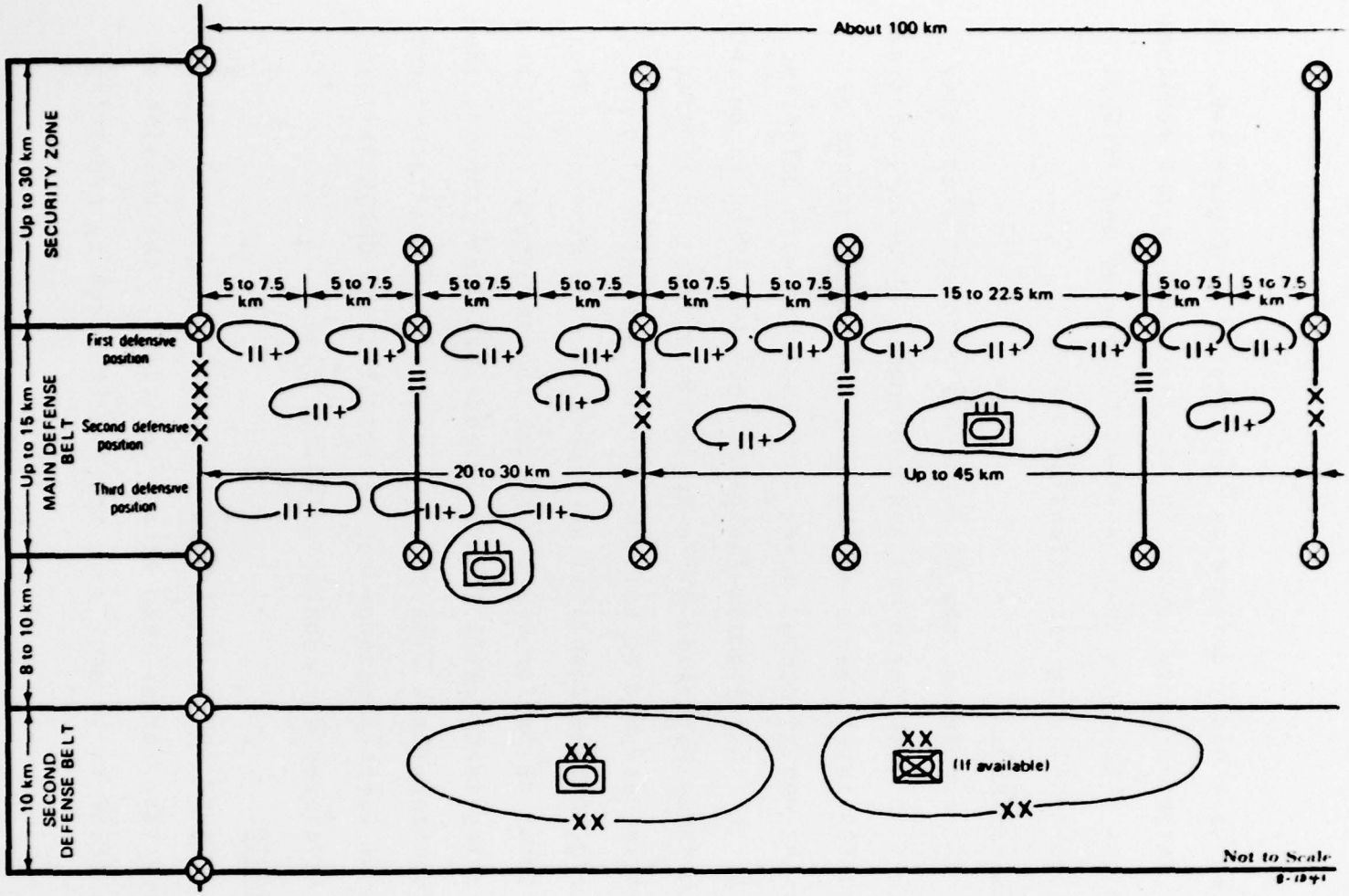
taken up a hasty defense as illustrated by Figure 5-6. He has suffered heavy losses in his first and second echelons and has determined that he needs to regroup and resupply before continuing his offensive drive.

US SITUATION.

As predicted, the US Force has also suffered heavy losses in both personnel and equipment. However, contrary to OPFOR intelligence and belief, the US is capable of massing enough combat power to breech his main defensive belt. US intelligence indicates that the OPFOR is defending with three Motorized Rifle Regiments abreast in a defense that is designed to hold key terrain but which also has a strong, mobile counterattack force at each echelon. His doctrine calls for him to use the counterattack force as a blocking force until the US advance has been stopped, then to counterattack with the next higher counterattack force. The US Corps commander has anticipated the OPFOR halt and has developed his counter offensive plan.

SENARIO.

Under the veil of darkness, the US has moved its tank-heavy task forces into attack positions. The mission of the AFIST is to assist in the breakthrough by providing



Source: USACGSC, Soviet Tactics in the Defense ,PT 100-3,VOL V (July 1978) p.26.

Fig. 5-6. Typical Defensive Organization

indirect fires from its attack helicopters, and supporting artillery. The AFISC is linked directly with the maneuver commander on the ground. Initially, the role of the AFIST is to support the main attack. Once a breakthrough is accomplished, an air and ground corridor is established where both air and ground forces can be funneled into the rear of the OPFOR's Army First Echelon. Quickly, the AFIST locates the OPFOR's Division-level counterattack force which is moving to counter the US success. The maneuver commander is informed and directs the AFIST to neutralize the force. This is accomplished in a similar manner as was discussed earlier in the OPFOR offensive senario. The center judiciously employs its forces by first weakening the OPFOR's air defense capability, attacking where the OPFOR is weakest or most vulnerable and by employing the appropriate force or forces at the critical times. The OPFOR's forces demonstrate good discipline and remain in position. This was the best course of action for him to take because any movement would have been quickly detected. However, his combat power rapidly decreases as the AFIST destroys his Regimental and Division Artillery groups, and his combat service support elements. Meanwhile, the maneuver elements exploited the

success and drove for the second defensive belt which was much less organized than the first. The end result was that the OPFOR had to withdraw in order to conduct a deliberate defense further to the rear. As he did, maximum advantage was taken to destroy his first echelon forces which have been directed to withdraw.

ANALYSIS.

The AFIST supported the maneuver force with improved fire support effectiveness and flexibility. Aerial assets in the direct fire role were not expended against targets when the risk was unnecessarily high or when the results could have been obtained by indirect fires. The OPFOR lost much of his combat power because his combat support (artillery and air defense assets) and combat service support elements were neutralized early in the conflict. His maneuver elements were forced to defend from their initial positions without the aid of effective fire support. His command and control elements were also neutralized early which resulted in a delay in his units regrouping to the rear. When movement did begin, the US Forces were in position to shift attack forces onto his moving columns within minutes of their detection.

OTHER COMMENTS.

The AFIST could have also served as an aerial command post or as an alternate command post. If the fire support coordination center had been lost, the effectiveness of the AFIST would have been degraded but the elements, at worst, would have reverted to independent operation until another center could have been established.

ENDNOTES

1. Department of the Army, Operations, FM 100-5, (1 July 1976) p. 3-3.

2. Department of the Army, Operations, p. 4-3.

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

Chapter 6

SUMMARY.

The AFIST concept is designed to provide for the employment of close air support, field artillery and attack helicopters on the battle simultaneously. At the core of the effort is the Aerial Fire Support Center that consist of specially trained personnel who understand all three elements of the team and can implement the concept. Chapters 2 and 3 discussed the current procedures involved in the control of each of the fire support elements and new equipment and munitions that are available or will be available by 1985. Chapter 4 explained how the Aerial Fire Support Center would be organized and operate. Chapter 5 discussed the communication problems associated with the AFIST and presented two tactical situations to demonstrate how the AFIST would generally work.

The purpose of this study is to present the AFIST concept is such a way that it can be understood and that a computer simulation can be developed to determine its

potential effectiveness. There are many other possible tactical situations other than the ones presented in Chapter 5 in which the AFIST could serve a useful purpose. In fact, the AFIST concept supports the principle of combined arms operation but with the emphasis on the fire support portion of the combat power equation. The AFIST is not intended to replace ground maneuver units, but is intended to support or assist them. One way to do this is to make fire support more effective. When ground maneuver forces are involved with the AFIST, the ground commander or task force commander would remain the overall commander of both ground and aerial assets.

Because of the broad scope of this study, many problems associated with the concept were not discussed or were discussed only briefly. However, the major problems were covered and proposals were presented to reduce or to eliminate them.

CONCLUSIONS.

1. The new weapon systems that are entering the US inventory by 1985 that are included in this study will be compatible with the AFIST concept.

2. When integrating CAS, field artillery, and attack

helicopter operations, a coordination and control center is needed. Therefore, the concept of the AFISC as part of the AFIST is logically sound.

3. The multiplier effect as discussed in this paper is logically sound and demonstrates the potential increase in combat effectiveness that the AFIST concept could bring about.

4. Because of the complexity of combining the three fire support elements in the study, the principle of centralized control, decentralized execution as applied to the AFIST concept is sound.

5. The overall AFIST concept is logically sound.

RECOMMENDATIONS.

1. That the concept be evaluated by computer simulation.

2. That after completion of the simulation, the concept be studied by a joint study group consisting of Air Force, United States Army Aviation Center and the United States Field Artillery Center representatives.

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